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Price  
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# AVIATION & WIRELESS News

No Set is Complete without the Radio MAGNAVOX

RADIO

## MAGNAVOX

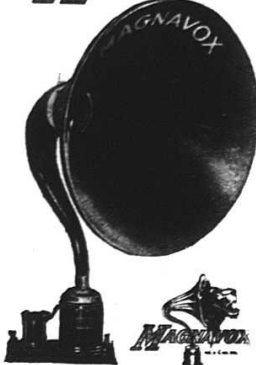
—the reproducer with the movable coil.

—world's standard loud speaker

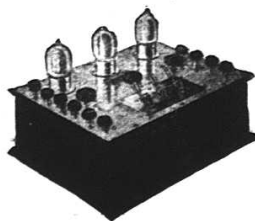


For you, the owner of a receiving set, and your friends, the Radio MAGNAVOX provides a source of satisfaction and scope of enjoyment obtainable from absolutely no other equipment. There is no substitute for the Radio MAGNAVOX.

### MAGNAVOX



MAGNAVOX  
Power Amplifier



"The reproducer with the movable coil," the loud speaker with the lion's lungs. Can produce great sound intensity without distortion. Beautiful, durable and efficient. No extras or adjustments required, and no danger of burning out. No set complete without one. Anyone can operate it, everyone can enjoy it. Easy to hook up. The few necessary instructions free with each outfit. Type R-2, with 18-in. horn and field switch, is the finest piece of apparatus of its kind manufactured. Uses only  $\frac{1}{2}$  ampere in field. Type R-3, smaller than R-2, with 14-in. horn. Consult your dealer or write us for folder.

The new MAGNAVOX two-stage and three-stage Power Amplifiers are designed for use with transmitter tubes and high-plate voltages to furnish amplifying power for the Radio MAGNAVOX, and minimize the possibility of sound distortion. Solid mahogany case. Sit either flat or on edge, simply throw the switch to operate. Consult your dealer or write for folder.

Properly energized, the Radio MAGNAVOX, the original loud speaker, will accomplish what no other radio apparatus ever has accomplished —great sound intensity without distortion. It's the famous MAGNAVOX movable coil that does it, and no other apparatus has this coil or can have it, because it is patented. With the Radio MAGNAVOX it is easy to reproduce radio music for home entertainment, for concerts, and for dances; easy, with the proper amplification, to reproduce everything received every bit as loud and clear as any occasion could possibly demand. But to do this make sure you get a genuine MAGNAVOX. There is no substitute for the Radio MAGNAVOX, and no set is complete without it.

If your dealer cannot supply you, write the MAGNAVOX Office nearest you for a beautiful folder, pricing and describing MAGNAVOX equipment.

## THE MAGNAVOX CO.

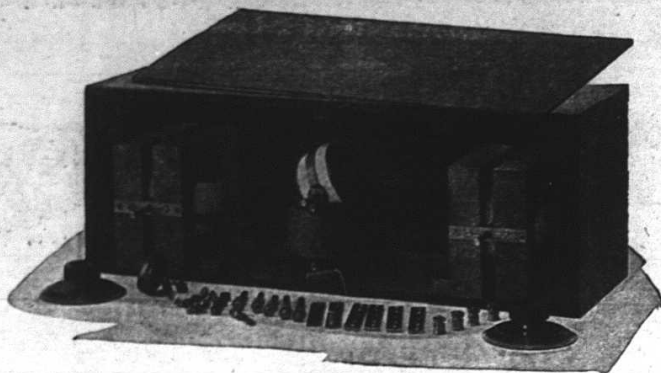
World Pioneers in the manufacture of  
sound amplifying devices.

General Office and Factory— Oakland, California  
New York Office—370-7th Ave., Penn Terminal Bldg.

In writing please address the MAGNAVOX office nearest you



There is No Substitute for the Radio MAGNAVOX



## PAQUIN UNASSEMBLED RECEIVER

As shown without Dials and Windings

**Made - in - Canada**

WITH ALL WINDINGS

**\$17.50**

200—600 Meters

**\$22.50**

The Set consists of—

- 1 Stained Oak Cabinet, 18" x 7" x 7", removable top and back.
- 1 Polished Celoron Panel, 18" x 7" x 1/8" to fit Cabinet.
- 2 Variometers, 4-3/4" square, mahogany wood, beautifully turned.
- 1 Winding Form for Stator Windings.
- 1 Celoron Coupler Primary tube 3-5/8" x 2 1/2" high.
- 1 Coupler Secondary Ball, mahogany turned.
- 7 Contact Points, 6 Binding Posts, 1 Switch Lever, 2 Stops.

Set complete with all holes drilled, (except panel), all necessary brass parts, screws, etc. for assembling, with directions. Panel drilled \$0.75 extra. Dials \$1.00 each.

This complete set of parts assembled in an hour's time, is a most exceptional value at only \$22.50 (\$17.50 if you do your own winding) and is our contribution towards the lower cost of Radio. Each set is of perfect workmanship, and sold under a money back if not satisfied, basis. This is undoubtedly one of the greatest values ever offered. Place your order to-day and be convinced.

Variometer Parts separate, wound \$4.00. Unwound \$3.00

Complete Vario Set comprising grid and plate Variometers and Variocoupler, all wound and ready to assemble \$12.00. Cabinet only \$5.50.

Note these SPECIAL Prices on Radio Apparatus—

Panel Mounting Rheostats	....	\$1.00	Firco Loud Speakers	....	\$38.50
Bakelite Plugs for Coils	....	.60	Bakelite Knobs and Dials	....	\$1.00
Fibre Plugs for Coils	....	.40			

Send 5c for our large illustrated catalogue.

787 Queen St. W. **J. M. PAQUIN** Toronto, Ont.  
THE ELECTRICAL SHOP

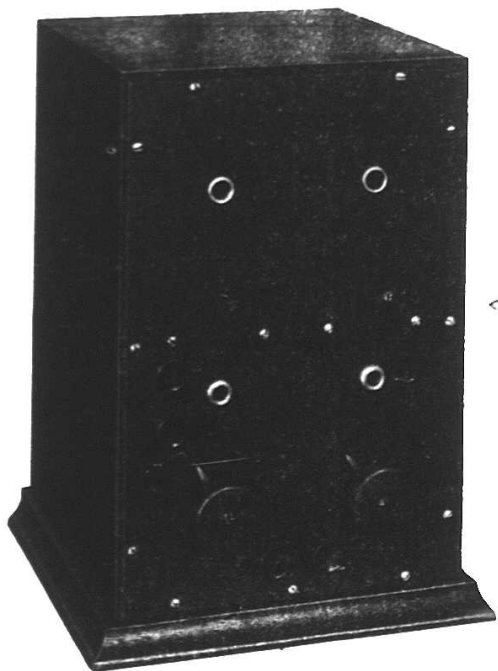
# Canadian Made Receiving Sets

We are now Ready to Book Orders for our "Universal" Receiving Sets. We sold the first lot of these before they were through the factory. It is made for use in the home and its finish and appearance qualifies it to a place in the best living room in any home.

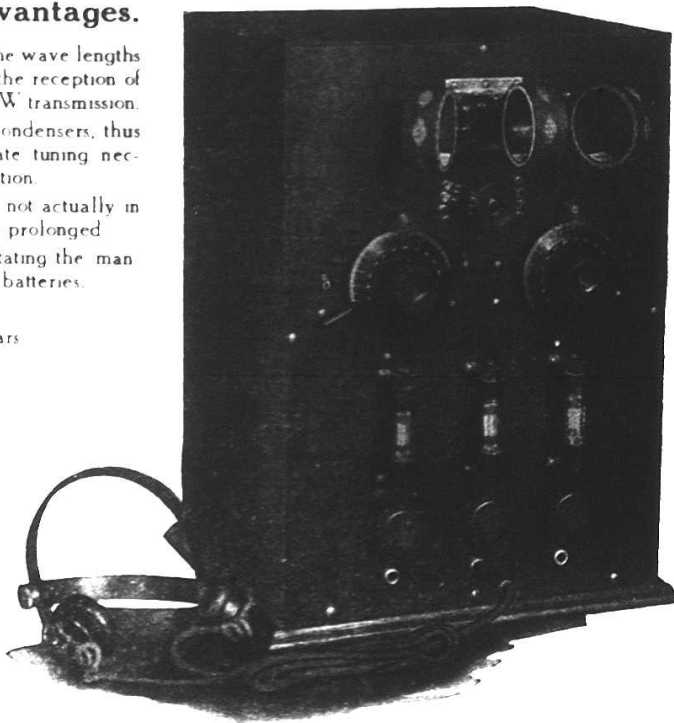
## Some of the "Universal" Advantages.

1. A wave length range completely covering the wave lengths in use at the present time, thus making possible the reception of radiophone broadcasts, as well as transatlantic CW transmission.
- 2.—Vernier attachments associated with the condensers, thus enabling the operator to accomplish the accurate tuning necessary in connection with continuous wave reception.
3. Automatic filament current control. Tubes not actually in use, not burning, the life of the tubes thus being prolonged.
4. Connections conveniently placed, thus facilitating the manipulation of the set and the replacement of "B" batteries.
5. —Comparatively small tube space occupied.

Write for price and further particulars



TWO STAGE AMPLIFIER.



"UNIVERSAL" RECEIVING SET.

## TWO STAGE AMPLIFIER

We have now on the market a Two Step Amplifier in two designs—Type "S" for standard tubes, and Type "J" for RAC-3 tubes. Both designs will operate practically free from noise. It measures 10 x 6 1/4 x 7 1/2 inches and is in a cabinet of quartered oak. It can be used with any receiving set—either crystal or tube—and will operate satisfactorily with Magnavox

Write for prices.

**OUR PRICES** on our own manufactured apparatus will be found considerably lower than the prices heretofore asked for apparatus of the same high grade. On our imported equipment and apparatus we are taking a very small margin of profit in order to make our prices reasonable.

We are the sole distributors in Canada for the De Forest equipment.

We allow special discounts to bona fide dealers.

Order through your local dealers or direct from us. Write us if you want any information re Wireless.

**CANADIAN INDEPENDENT TELEPHONE CO., LIMITED**

Offices : 212 KING STREET W.

Factory : WALLACE AVE., TORONTO

# Canadian Made Receiving Sets

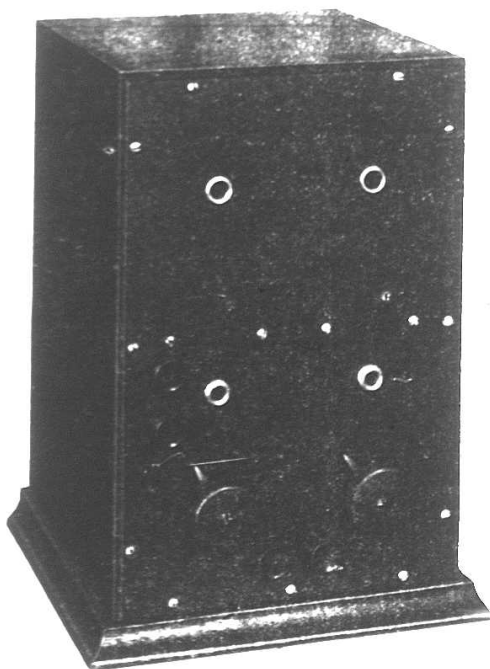
We are now manufacturing a line of Canadian Made Receiving Sets. We sell the complete equipment for the amateur and the factory. This is for use in the home and for the office. It is a complete set of the best and most modern equipment.

## Some of the "Universal" Advantages.

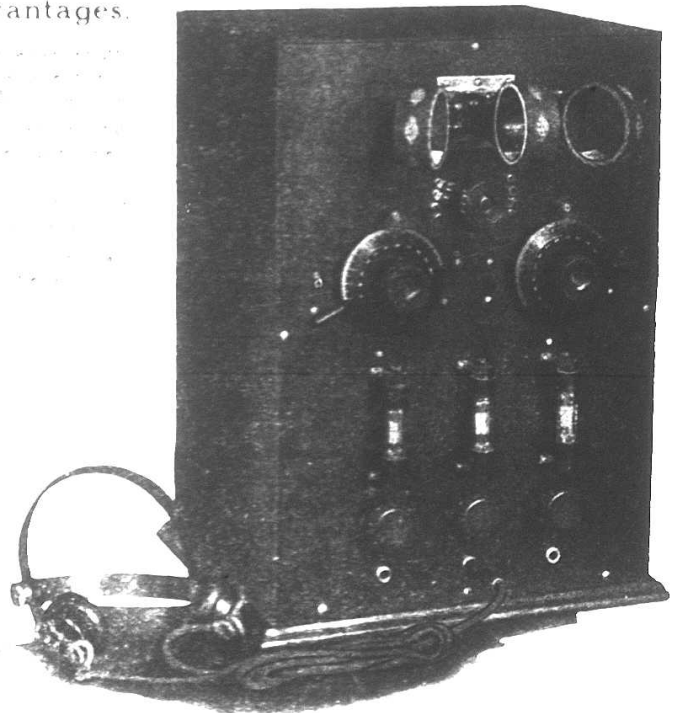
It is a complete set of the best and most modern equipment. It is a complete set of the best and most modern equipment. It is a complete set of the best and most modern equipment.

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TWO STAGE AMPLIFIER



UNIVERSAL RECEIVING SET

## TWO STAGE AMPLIFIER

We have now in the market a Two Stage Amplifier in two designs. Type B is for standard tubes and Type C for 6X4 tubes. Both designs will operate practically free from noise and hum. It is 12 inches high and 10 inches wide. It can be used with any receiving set, either in the home or in the office, and will operate satisfactorily with Marconi.

Write for price.

## OUR PRICES

We are now manufacturing a line of Canadian Made Receiving Sets. We sell the complete equipment for the amateur and the factory. This is for use in the home and for the office. It is a complete set of the best and most modern equipment.

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**CANADIAN INDEPENDENT TELEPHONE CO., LIMITED**

Offices: 212 KING STREET W.

Factory: WALLACE AVE., TORONTO



# AERO CLUB of CANADA

Affiliated with  
The Royal Aero Club of The United Kingdom and The Federation Aeronautique Internationale

## Honorary President

H.R.H. THE PRINCE OF WALES, K.G.

## President

LT.-COL THOMAS GIBSON, C.M.G., D.S.O., Etc.

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(Deceased)

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O.B.E.

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Club Headquarters: 34 Yonge Street, Toronto

## OBJECTS OF THE AERO CLUB

1. TO PROMOTE AND MAINTAIN A SOCIAL ORGANIZATION OR CLUB FOR THE ADVANCEMENT AND ENCOURAGEMENT OF VARIOUS FORMS OF AVIATION.
2. TO ADVANCE THE DEVELOPMENT OF THE SCIENCE OF AERONAUTICS AND ITS PRACTICAL APPLICATION.
3. TO ENCOURAGE AND ASSIST THOSE DESIROUS OF TAKING UP AVIATION WITH A VIEW OF RENDERING SERVICE TO KING AND COUNTRY.

### OBJECT NO. 1

Club quarters are being maintained, including lounge, billiards, cardroom and lunchroom.

\* Until further notice the Clubrooms are open daily from 9 A.M. to 10 P.M. except Sundays and public holidays

\* Meals are served daily to members and their guests.

\* THE DIRECTORS ARE NOW CONSIDERING PROPOSITIONS FOR MORE ADEQUATE QUARTERS IN WHICH IT IS HOPED TO PROVIDE BEDROOM ACCOMMODATION FOR VISITING MEMBERS.

\* As soon as deemed advisable and practicable, the Club will endeavour to maintain and operate an airharbor and suitable aircraft for the use of members, or to make suitable arrangements with an existing concern.

\* Out-of-town members are invited to write in to the club on any matters in which the Club can reasonably render personal service for members.

### OBJECT NO. 2

Ways and means are being provided for making the Club a clearing house and information bureau on matters of aeronautical interest.

\* Members and others are invited to correspond with the Club—especially those who are engaged in commercial aviation, or are in a position to teach flying.

\* Owners of aircraft open for contract work are invited to register with the Club. Full information with regard to equipment and terms should be given.

\* It is desired to obtain costs of operation in order that reliable data may be compiled for the use of members and aviation interests.

### OBJECT NO. 3

The Club is in favour of the Government maintaining an Air Force on adequate and economical lines consistent with the considered opinions, as to organization, of those competent to advise.

\* The Club will use its influence and organization in encouraging the youth of our country to engage in aeronautical work for the development of our commerce and natural resources, and for service to the Empire when necessary.

## MEMBERSHIP

Membership is open to Officers of the Canadian Air Force, Officers and Cadets of the Royal Air Force, and other branches of the Canadian and Imperial United Services; also to civilians wishing to take up or become interested in aviation generally. Apply to the Secretary for terms of membership and application forms.

Membership carries privileges of visiting membership in all Aero Clubs throughout the world affiliated with the Federation Aeronautique Internationale.

The regular monthly issue of *Aviation News* is mailed free to all members.

## AERONAUTICAL SPORTING EVENTS, RECORDS, ETC.

The Federation Aeronautique Internationale is recognized throughout the world as the dominant authority for the control of aeronautical sporting events and for the establishment of aeronautical records, and provides the necessary rules and regulations for the conduct of such. By agreement through the Royal Aero Club of the United Kingdom, authority has been vested in the Aero Club of Canada to represent and act for the F. A. I. in the Dominion of Canada.

# Condensite - celoron

**IS REAL RADIO INSULATION**  
*Use the highest type insulation made.*  
**PRODUCED EXPRESSLY FOR WIRELESS WORK.**

Adaptable to every machining process and ready for every use—panels, plates, bases, rods, tubes, bushings, handles, cleats, etc.

To high resistivity and extreme water resistance CONDENSITE CELORON adds every other good quality demanded of an efficient insulator. It puts wireless insulation a step ahead. This Bureau of Standard test tells why:

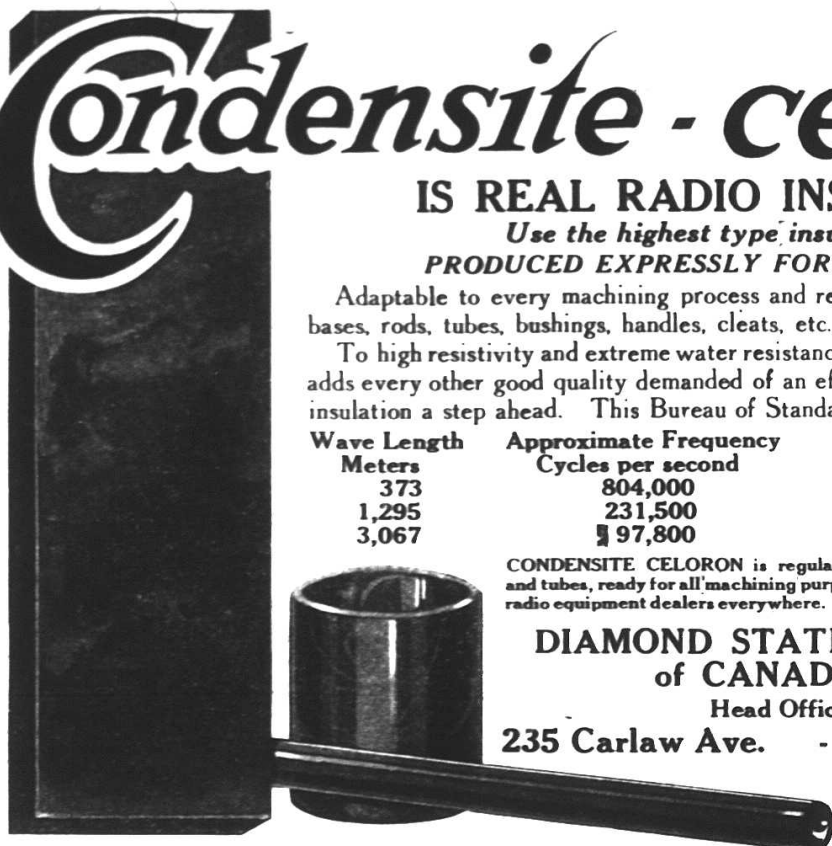
Wave Length Meters	Approximate Frequency Cycles per second	Phase Difference Degrees	Dielectric Constant-K
373	804,000	2.0	4.7
1,295	231,500	1.8	4.8
3,067	97,800	1.8	4.9

CONDENSITE CELORON is regularly supplied in standard size sheets, rods and tubes, ready for all machining purposes—for experts and amateurs. Sold by radio equipment dealers everywhere. If your dealer cannot supply you, write us.

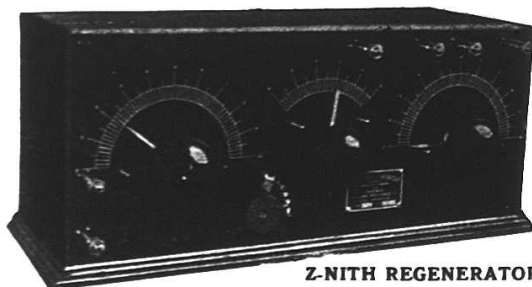
**DIAMOND STATE FIBRE COMPANY  
of CANADA, LIMITED**

Head Office and Works:

235 Carlaw Ave. - - TORONTO, Ont.



**A --  
Fine--  
Present**



**Z-NITH REGENERATOR**

**Lasting  
the Year  
Round**

What could be more desirable as a Gift than an instrument that opens to its owner the gateway to a world of new, interesting, and instructive experience?

The user of a Z-Nith Regenerator has the Radio world at his will, Radiophone, CW and Spark Stations audible on ordinary equipment can be copied with ease

on this improved set, with **Balanced Variometers**, 180-1200 meters range, 180° coupling, etc.

If your station already has a Z-Nith Regenerator; a Hy-rad Rotary Gap, an Amplifigon or one of the many other Individual Z-Nith Products will form an equally satisfactory gift.

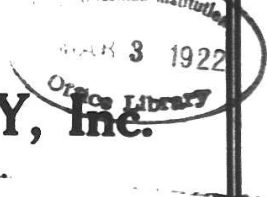
**We can Make Immediate Shipments**

**CHICAGO RADIO LABORATORY, Inc.**

6433 RAVENSWOOD AVE., CHICAGO, ILL. U.S.A.

Write us or our

Canadian Representative—Ontario Radio Laboratory, 422 North St., Sault Ste. Marie, Ont.



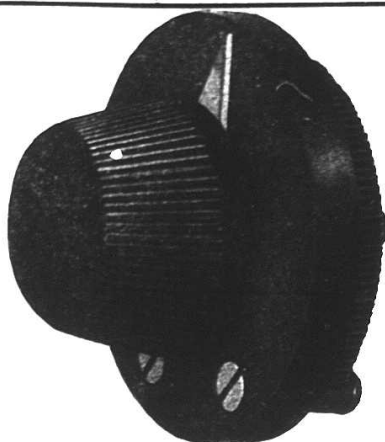
# STEPPING-STONES TO BETTER SIGNALS



## INDUCTANCE SWITCH

The neatest switch on the market and the easiest one to adjust. Has the FADA Thermoplas knob.  $1\frac{1}{4}$  inch radius. Each ..... \$0.50

With eight switch points and two switch stops complete. Each ..... \$0.75



## FADA DETECTOR-AMPLIFIERS

include the following instruments, in beautiful cabinets and with full automatic filament control:—

Detector Control .....	\$16.50
Detector and One stage Amplifier .....	45.00
Detector and Two stage Amplifier .....	65.00
Two stage Amplifier .....	50.00

## A BEAUTIFUL FADA CATALOG

of instruments will be mailed upon receipt of ten cents. Contains complete description and illustrations of all FADA instruments and supplies. You should study this catalog before purchasing any equipment.

## CANADIAN RADIO STORES

FADA products are fast sellers that stay sold. The sales prices are reasonable and your profits good. Write for catalog and terms.

# FRANK A. D. ANDREA

Manufacturer of FADA Radio Products

1882-E JEROME AVE.

NEW YORK CITY

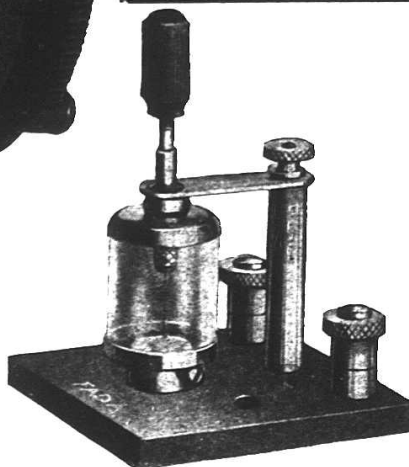
Every FADA instrument, be it detector and two-stage amplifier or only a simple inductance switch, is a real asset to your station. Step by step as you progress from your crystal detector set to vacuum tubes, regenerative circuits and radiophone work you will find that FADA supplies are necessities, and what is more, necessities that can be purchased from your own dealer at most reasonable prices for the value you receive.

## PANEL-MOUNTING RHEOSTAT

FADA rheostats are made with a heat proof Thermoplas base. The resistance is 6 ohms and it will carry  $1\frac{1}{2}$  amperes. Supplied with the FADA conical Thermoplas knob. Adjustment very smooth. Without question the best value obtainable for ..... \$1.00

## FADA CRYSTAL DETECTORS

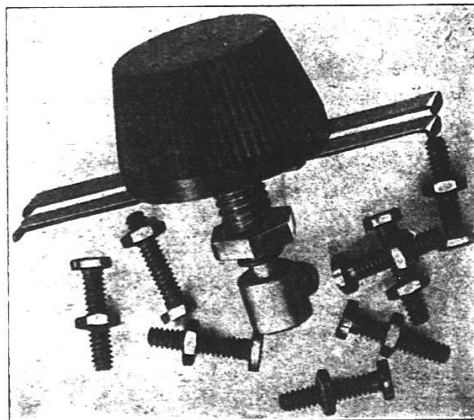
are used in thousands of amateur stations with mighty good results. Beautiful in appearance, convenient to adjust, and supplied with a super-sensitive galena crystal that enables long distance reception. Each ..... \$2.25



## SERIES-PARALLEL SWITCH

Another FADA switch that is very popular.  $1\frac{1}{2}$  inch radius, Thermoplas knob. Each.....\$0.75

Complete with eight switch points and two steps. Each ..... \$1.00



When writing to Advertisers please mention Aviation & Wireless News.

# RADIO APPARATUS

*Distributors of Reliable Radio Apparatus  
to Dealers, Schools, Colleges, Radio Clubs and  
Experimenters All Over the World!*

"PITTSICO"

SERVICE DISTRIBUTES "RADIO  
CORPORATION'S" PRODUCTS ALL OVER  
THE WORLD! TRY US AND SEE!



"PITTSICO"

NOW HAS TWO STORES! BOTH  
CARRY "RADIO CORPORATION'S"  
COMPLETE LINE. ORDER TODAY

**AMPLIFIERS**  
No. DA Westinghouse, Detector and two stage in mahogany cabinet. \$63.00  
No. RORD Grebe, two stage with automatic filament control jacks. 55.00  
No. RORD Grebe, Detector and two stage with automatic filament control jacks. 75.00  
No. 2634 Amrad, Detector and two stage in mahogany cabinet. Splendid value. 47.50

**AMPLIFYING TRANSFORMERS**  
No. UV-712 Radio Corporation. 7.00  
No. QO Clapp-Eastham, semi-mounted. 4.00  
No. 50 Chelsea, new type. 4.50

**ANTENNA WIRE**  
"Pittsco" No. 14 Hard Drawn Copper (80 ft. per lb.), per lb. .40  
500 ft., special value at. 2.25  
"Pittsco" 7 Strand No. 22 Tinned Copper, per ft. .425  
500 ft. 4.25  
1,000 ft., special value at. 7.50  
"Pittsco" 7 Strand No. 20 Phosphor Bronze, per ft. .02  
500 ft., special value at. 7.50

**"B" BATTERIES**  
No. 7623 Standard 22.5 Volts, small. 1.50  
No. 7625 Standard 22.5 Volts, large. 2.65  
No. 7600 Standard 22.5 Volts, variable 16 1/4 to 22 1/2 Volts. 3.00  
No. 7650 Standard 22.5 Volts, large, variable, 15 variations. 3.50  
No. 763 Eveready 22.5 Volts, small. 2.25  
No. 766 Eveready 22.5 Volts, large, 16 1/4 to 22 1/2 Volts. 3.00  
No. 627 Ace, 45 Volts, variable. 3.50

**COILS (Duo-lateral)**  
DL-25 \$1.40  
DL-35 1.40  
DL-50 1.50  
DL-75 1.50  
DL-100 1.55  
DL-150 1.60  
DL-200 1.65  
DL-250 1.70

**COIL MOUNTINGS**  
No. LC-100 DeForest 3 Coil Mounting, with gears, reduced price. 6.00  
No. LC-101 DeForest 3 Coil Mounting with gears and wooden base. 9.50  
No. 400 Remler 3 Coil Mounting with base and extension handles. 6.50

**CONDENSERS (For CW work)**  
No. UC-1014 Radio Corp. .002 MF., 3000 volts. 2.00  
No. UC-1015 Radio Corp. .0003, .0004, .0005 MFD., 7500 volts. 5.60

No. UC-1803 Radio Corp. .000025 MF., 10,000 volts. 5.00  
No. UC-1806 Radio Corp. .002 MF., 6000 volts. 7.00

**CONDENSERS (Grid and plate types)**  
No. UC-570 Radio Corp. .0025 MF. \$2.00  
No. UC-569 Radio Corp. .001 MF. 1.50  
No. UC-568 Radio Corp. .0005 MF. 1.35  
No. UC-567 Radio Corp. .00025 MF. 1.20  
No. UX-543 Radio Corp. Condenser mtg. .50

**CONDENSERS (Filter type)**  
No. UC-1631 Radio Corp. 5 MF. 750 volts. 1.35  
No. UC-1632 Radio Corp. 1 MF. 750 volts. 1.75  
No. UC-1634 Radio Corp. 5 MF. 1750 volts. 1.50  
No. UC-1635 Radio Corp. 1 MF. 1750 volts. 2.00

**C. W. INDUCTANCES**  
No. UL-1008 Radio Corporation. 11.00  
No. P-1 Acme. 8.00

**C. W. POWER TRANSFORMERS**  
No. UP-1633 Radio Corp. 375 watts. 4.25  
No. UP-1016 Radio Corp. 750 watts. 7.50  
Acme 200 Watt, 350-550 volts mtd. .02  
Acme 200 Watt, 350-550 volts unmt. 7.50

**FILTER REACTORS**  
No. UP-1626, 160 milliamperes. 11.50  
No. UP-1627, 300 milliamperes. 15.75  
**GRID LEAKS (Radio Corporation)**  
No. UP-1719, for 5 watt tubes. 1.10  
No. UP-1718, for 50 watt tubes. 1.65  
No. UP-516, 1/4, 1, 1.5, 2 or 3 megohms each, complete with mounting. 1.25  
Grid Leaks only, each. .75

**HOT WIRE METERS**  
No. P-1 Roller-Smith 0-2.5 Amperes, flush mtg. Special value at. 4.75  
No. UM-530 Radio Corp. 0-2.5 amps. 6.00  
No. UM-533 Radio Corp. 0-5 amps. 6.25

**JACKS (Radio type)**  
No. 61 Patent Open Jack. .70  
No. 62 Patent Closed Jack. .75  
No. 63 Patent 2 Circuit. 1.00  
No. 65 Patent Three Spring Automatic, filament control type. 1.20  
No. 66 Patent Five Spring A. F. C. 1.50

**LOUD SPEAKERS**  
No. R-3 Radio Magnavox, new type horn, very latest model. 45.00  
No. P-1 Vocaloud, station type. 70.00  
No. 400-W Federal Telephone. 14.00

**RECEIVING SETS (Crystal)**  
"Aerola Jr.," Westinghouse, complete with Brandes "Superior" phones. 25.00  
"Radiola," DeForest, complete with Brandes "Superior" phones. 25.00  
Radio Service Type S-8, without phones, splendid value. 7.50

**MAGNETIC MODULATORS**  
No. UT-1634, 1/4 to 1 1/2 amperes. \$9.50  
No. UT-1357, 1 1/4 to 3 1/2 amperes. 12.50  
No. UT-1637, 3/4 to 5 amperes. 17.00

**RECTIFYING DEVICES**  
No. UV-216 Radio Corp. "Kenotron," 20 watt type for UV-202 tubes. 7.50  
No. UV-217 Radio Corp. "Kenotron," 150 watt type for UV-203 tubes. 26.50  
No. P-1 DeForest 20 Watt Rectifying Tube for use with 5 watt tubes. 7.00

**RECTIFYING DEVICES (For "A" Batteries)**  
No. P-1 Tungar, 5 ampere style, complete with bulb. 23.00  
No. P-2 Tungar, 2 ampere type with bulb. 18.00  
No. P-3 FF Battery Booster, 5 amp. type. 15.00

**REGENERATIVE RECEIVERS**  
No. CR-3 Grebe "Relay-Special" 175-680 meters. 25.00  
No. CR-5 Grebe, 175-3000 meters, "Super-special," complete set. 65.00  
No. CR-8 Grebe 175-1000 meters, complete set, latest "Relay-Special" 80.00  
No. CR-9 Grebe, 175-3000 meters, complete set with det. and two stage amplifier, self contained, "A Masterpiece" 130.00  
No. RA Westinghouse, 180-700 meters, very selective, mahogany cabinet. 63.00  
No. RC Westinghouse, RA receiver and DA Det. Amplifier combined in one cabinet, a splendid unit, compact. 130.00

**TELEPHONES**  
No. 56 Murdock, 2000 ohm., double. 5.00  
No. 56 Murdock, 3000 ohm., double. 6.00  
No. CW-874 Western Electric, 2200 ohms. 15.00  
Brandes "Superior," with new headband. 8.00  
Brandes "Trans-Atlantics," with new headband. 12.00  
Brandes "Navy Type," with new headband. 14.00  
Baldwins Type C. 12.00  
Baldwins Type E. 13.00  
Baldwins Type F. 14.00  
Baldwins Type C unit only. 6.00  
Federal A. and N. Type, 2200 ohms. 8.00  
Federal A. and N. Type, 3200 ohms. 10.50

**VACUUM TUBES**  
No. UV-200 Radiotron Detector. 5.00  
No. UV-201 Radiotron Amplifier. 6.50  
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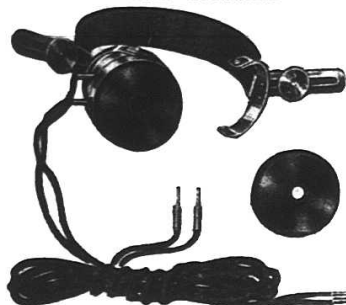
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## THE OBJECTS OF THE CLUB

(1) To advance the art and science of radio communication by bringing together those who are interested in radio work, whether as scientists, professional radio engineers, manufacturers of radio apparatus, students, experimenters—in short—all those whose work or interest brings them in touch with the problems of radio.

(2) To conduct and co-operate in radio research.

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Membership is open to engineers, students and anyone else interested in the electrical side of Radio. Application for membership should be sent to the Secretary-Treasurer. They should state experience in Radio work and give as references names of three members of the Club.

## MEETINGS

Meetings are held every third Thursday in Room 23, new Electrical Building, University of Toronto. A programme of papers by prominent Canadian Radio Engineers is being prepared for the coming season.

## RADIO INQUIRY DEPARTMENT

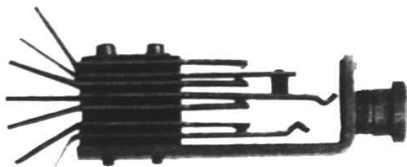
As an assistance to those interested in Radio, an Inquiry Department is being conducted in "Aviation and Wireless News," for particulars of which see announcement set out elsewhere in this issue.

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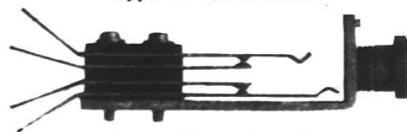
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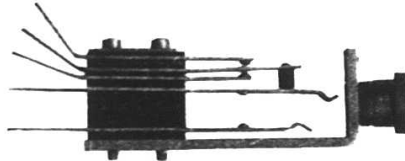
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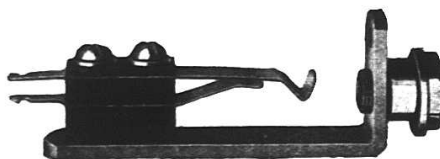
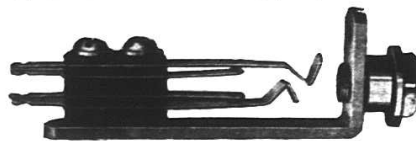
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# WIRELESS NEWS

A. F. PENTON & Co., Publishers.

C. E. WILLIAMS, EDITOR

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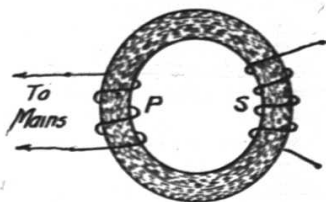
Volume 4.

TORONTO, FEBRUARY, 1922.

No. 12

## Transformer Design for Radio Amateurs By One of Them

Figure 1 shows the elementary diagram of a transformer. The primary coil, P, is connected to the A. C. mains, and the secondary coil, S, is connected to the plates or the filaments of your transmitting valves, or to



your front-door bell, or whatever else you wish to supply with current at a different voltage from the line voltage.

The first point which arises is what voltage we will get when there are, say, 100 turns on the primary, 10 turns on the secondary, and the primary voltage is 110 volts? The answer, as most radio amateurs know, is 11 volts. There might equally well have been 1,000 turns on the secondary, in which case the secondary voltage would have been 1,100 volts. But is 100 turns on the primary enough? Why not 200 or 1,000? Here is where the designer comes in. You can design a transformer as well as an electrical engineer, and I propose now to show you how.

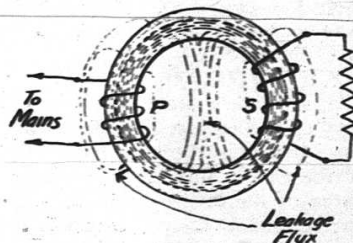
To start with you must know several things. These are, (1) the voltage of your supply mains, (2) the frequency of the supply, (3) what voltage you wish to get from the secondary, and (4) what current you will want to draw from the secondary. Considering this last, it will be best to make generous allowances for future requirements. Remember also, Brother Ham, if you are building a filament transformer, for instance, you will want a small surplus voltage, over and above that required to light the filaments of your valves to full brilliancy. Now multiply your secondary amperes and secondary volts together, and the result is the watts rating of your transformer. As no electrical equipment is perfect, including transformers, the input watts of your transformer will be more than the figure just obtained. The nearer it is to that figure the more efficient your transformer will be. In small transformers, such as the one that you are go-

ing to build, the normal efficiencies run about 90% at full load. I am not speaking now about spark transformers, the efficiencies of which are lower.

To show you the considerations which enter into the design of such a small transformer, I shall now carry through the design of a transformer of 125 watts output, to operate on 115 volts, 25 cycles. For the moment we will not bother with the purpose of the transformer, but will take that into consideration when designing the secondary.

Let us suppose that the efficiency (at full load) of our transformer will be 90%. Then the watts input will be  $125/.9$  or 139 watts. This means that 14 watts will be lost in the iron of the core, and in the resistance of the windings of the transformer when it is working at full power. Now the best efficiency will be obtained when the loss in the core is the same as the loss in the winding. Hence, for the transformer under consideration, let us decide that there will be 7 watts lost in the iron of the core (at any load) and 7 watts in the windings (at full load). Sub-dividing the winding loss, let us say that there will be 4 watts lost in the primary and 3 in the secondary.

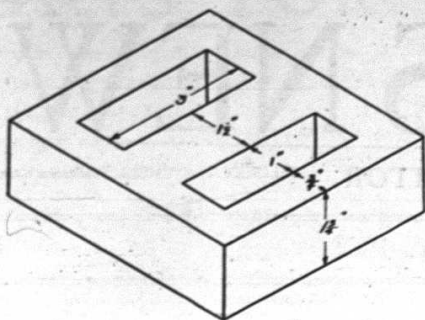
Now, I shall suppose that you have been fortunate enough to get some good transformer iron or silicon steel from some discarded electric lighting transformer, or other source. In such iron the losses are about 0.9 watts per pound at the magnetic flux density (90,000 lines per square inch) and frequency (25 cycles) at which we are going to work it. So, for a total iron loss of 7 watts,



about 8 pounds of iron must be used in the core. One of the shapes shown in Figure 2 will be about the right size and weight.

Graphs of the losses in silicon steel at any flux density,

and of the magnetizing force necessary to produce any density can be found in an electrical handbook. The maximum flux density in silicon steel should not exceed about 90,000 lines per square inch for 25 cycles, or about 70,000 lines per square inch for 60 cycles. This is de-



termined by the losses in the iron and the magnetizing currents necessary which attain values higher than those compatible with good design if greater flux densities are employed.

The shape of the transformer core is governed largely by the consideration that it is desirable to keep all the magnetism, or as much of it as possible, in the iron of the core. To this end the path of the magnetism through the iron must be made as short as possible, and the possible paths through the air around the core as long as possible. For this purpose, (b) Figure 2, is the best shape. The coils would be wound on the middle leg, one over the other, or wound in sections and interleaved. This shape of core, however, requires special stampings, and is therefore more difficult of construction for the amateur. Let us compromise, then, on the shape of Figure 2 (a), making the "window" or opening in the core of oblong shape and winding the coils on the long legs. In the type of transformer used for "spark" wireless, the effects of leakage flux are desirable in many cases, and these transformers are therefore wound on the short legs of similarly shaped cores.

Next, it is a good thing to consider the magnetizing force required to produce in the iron the desired flux density. For silicon steel the magnetizing force necessary to produce 90,000 lines of force per square inch is about 18 ampere-turns per inch of length of the magnetic path. In the core shown in Figure 2 (a), the average length of the magnetic path is 14 inches, and hence the magnetizing force will have to be  $14 \times 18$  or 252 ampere-turns. From this quantity, when we know the number of turns that are to go on the primary winding, we can calculate the number of amperes necessary to magnetize the core up to the desired flux density.

The next thing to decide is the number of turns of wire that will have to be wound on the primary. The formula from which it is obtained is,—

$$N = 22.5 \times E \times 1,000,000 / f \times F$$

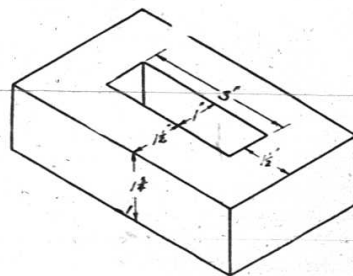
In this formula, E is the voltage of the supply mains, f is the frequency of the supply, N is the number of turns on the primary, and F is the total flux. To get F we must multiply the chosen flux density (in this case 90,000) by the area of the cross-section in which this flux "flows." Now the area of the cross-section of the core is  $1\frac{1}{2} \times 1\frac{3}{4}$  or 2.625 square inches. This is not all iron, however. Some of the space is taken up by the rust on the iron, and some by the small crevices between the laminations. It is almost impossible to tell just how much space is thus taken up, but if we say that only 80% of

the cross-section of the core is really iron we will be on the safe side. So the area of the iron of the core will be  $.8 \times 2.625$  or 2.1 square inches. Now, to find the number of primary turns is plain sailing. Putting the values we know in the formula gives us

$$N = 22.5 \times 115 \times 1,000,000 / 25 \times 90,000 \times 2.1 = 548 \text{ turns.}$$

Before we forget it, let us calculate the magnetizing current for the core. It will be magnetizing ampere-turns / primary turns or  $252/548$  or 0.46 ampere.

The next question we must tackle is the size of wire to use on the primary. This must be determined by trial, and a little experience is here of great help. Let us start with No. 18 gauge B. & S. enamelled wire. From the wire table we see that we can wind this wire so that there are 23.9 turns per inch. Now (leaving 1/16 inch at each end for insulation) we have 2.875 inches to wind the primary on. Hence the number of turns per layer will be  $2.875 \times 23.9$  or 68 turns. The number of layers that will be necessary will be  $548/68$  or, say 9 layers. The thickness of the winding will be  $9/23.9$  or .329 inches. As the window of the core is 1 inch wide, we see that there will be enough room for the secondary when the primary is wound on. The question now is whether this wire is big enough to carry the full load of the transformer without heating up or exceeding the loss of 4 watts we have allowed. The load current in the primary will be  $139/115$  or 1.21 amperes. Now in addition to this load current there is also the current necessary to magnetize the core. We have found that this is 0.46 ampere. To add the two, taking into account that the magnetizing current is approximately 90 degrees behind the load current, we must take the square root of the sum of their squares. Thus the total primary current will be 1.29 amperes. To find the watts lost in heating the primary winding it is first necessary to know the resistance of this winding. Figure 3, which shows a cross-section of the core with the two windings, will help. The length of the average turn will be about 8.32 inches. As there are 548 turns the total length of wire will be  $548 \times 8.32$  inches, or 380 feet. From the wire table it is seen that 1,000 feet No. 18 has a resistance of 6.374 ohms. Therefore 380 feet will have a resistance of 2.42 ohms. The watts-lost in the resistance of this winding will then be the square root of  $R I$  or 2.42 times the square root of  $(1.29)^2$  or 403 watts. This is nearly the value which we fixed for the primary when deciding the division of losses, hence the size of wire we have chosen is large enough. If we had found that the loss was much over the figure set, it would have been necessary to try another size of wire, and see firstly, whether it would



leave room for the secondary winding, and secondly, whether it would give a winding of sufficiently low resistance. It might, and probably would, be necessary to slightly enlarge the size of the window in the core to accommodate the larger wire. That would mean a slight



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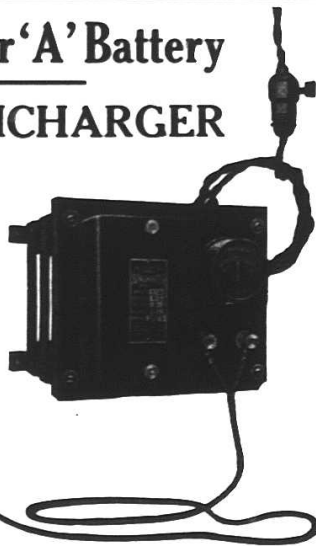
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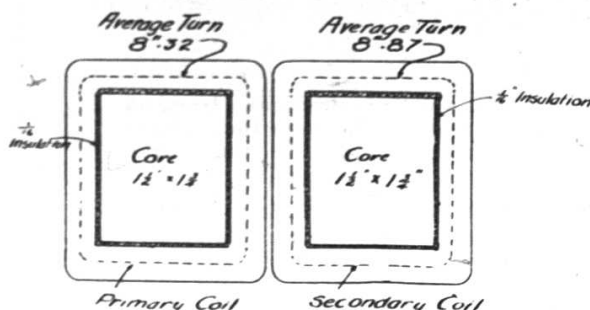
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increase in the core loss, and a more important increase in the magnetizing current.

Up to this point we have said nothing about what sort of a secondary the transformer was to have. The primary we have designed will be o.k. for any secondary, as long



as it is within the watts rating of the transformer. Let us say that we require 16 volts, in two sections of 8 volts each for some purpose such as lighting the filaments of transmitting valves. We shall then have to wind  $(16/115) \times 548$  or 66 turns on the secondary, and the wire must be of such a size that it will carry 128/16 or 8 amperes, with a loss not greater than 3 watts. Let us try No. 10 B. & S. gauge wire. From the wire table we see that we can wind 8.8 turns per inch and so can get  $8.8 \times 2.875$  turns on each layer of winding. We shall have to wind three layers. It would be better to wind the secondary in two sections insulated from each other, but, for the purposes of calculation we shall treat it as one winding. If we calculate the amount of wire and its resistance as before we find that it will take 46 feet and the resistance will be .0046 ohms. The watts lost in this resistance when 8 amperes are flowing will be  $.0046 \times 64$  or 2.94 watts. As this is below the figure we set, we may take it to be good.

We have now completed the design of the transformer. To find the cost of construction,  $1\frac{3}{4}$  lbs. of No. 10 and  $2\frac{1}{4}$  lbs. of No. 18 will be more than enough. You will find that this comes to about \$3.50. The cost of the core depends upon where you get it. The iron, if obtained from the electric light company, will probably be given to you without charge. Terminal strips, binding posts and clamping pillars will be an extra that you can arrange to suit yourself.

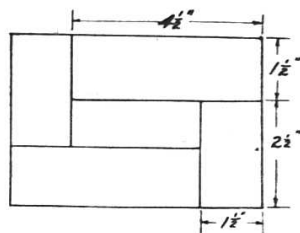


Lt. Com. C. P. Edwards, Director Radio Branch, Department of the Naval Service of Canada.

Now, a few useful tips about how to go about the construction of such a transformer as this may not be amiss.

In laying out the core, the first layer should be as shown in Figure 4. The second layer should be just the opposite to this so as to "break" joints. The size of the laminations will be  $4\frac{1}{2}$  inches by  $1\frac{1}{2}$  inches for the larger pieces and  $2\frac{1}{2}$  inches by  $1\frac{1}{2}$  inches for the smaller. When you are cutting up the iron sheet be very careful to get all the pieces of the same size and all square. It is very important that all the joints in the finished core be magnetically good, as otherwise the core will require a very heavy magnetizing current, and the transformer may be burnt out on full load. It might be well to insulate each lamination from that on top of it by a layer of shellac on one side of each lamination only. This is not usually necessary, however, as the thin layer of rust on the iron is sufficiently good insulation for a small transformer. The insulating of the laminations prevents excessive losses in the iron due to eddy currents. For this reason it is not desirable to file the edges of the finished core. This would tend to burr over the edges of the laminations and annul the insulation between them. The space factor of 80% which we adopted for the core will cover a multitude of lesser sins, but take care that you commit none of the greater.

In winding the coils it is best to wind them properly in layers. You must have patience and do this carefully or you will find that more wire is needed than if it were wound carefully, and besides it may be very hard, or im-



possible, to get all the necessary turns in the space calculated. The best way is to wind the coils on a former. The dimensions of this you can arrange to suit yourself. Give the winding block a little taper to enable the coils to be drawn off so that they can be taped. Wind a layer or two of paper on the former before starting with the wire, and allow lots of space between the coil and the core so that you get the coil on the core after it is taped up. For taping the coils the best thing to use is Empire Cloth tape about  $\frac{3}{4}$  inch wide. This tape has a very high dielectric strength, and is a much more suitable insulator than the ordinary black electricians' tape. When you are removing the winding from the former be very careful to see that none of the top end turns, slips down and lies alongside the bottom end turns. This is especially necessary if you are winding a high-voltage secondary in place of the one described.

Now while I have carried out the design of one size of transformer only, I have given you an example of how you might figure out a transformer for yourself. If you study this article carefully you should have no difficulty in designing any small transformer you may need for your radio set. In larger transformers it is necessary to take into consideration the amount of heat which is generated in the windings and the ability of these to dispose of the heat without becoming too hot. In small transformers, however, up to say  $\frac{1}{2}$  K.W., if you work for an efficiency of 90%, you will be quite safe for the usual short runs that wireless transformers have to stand.



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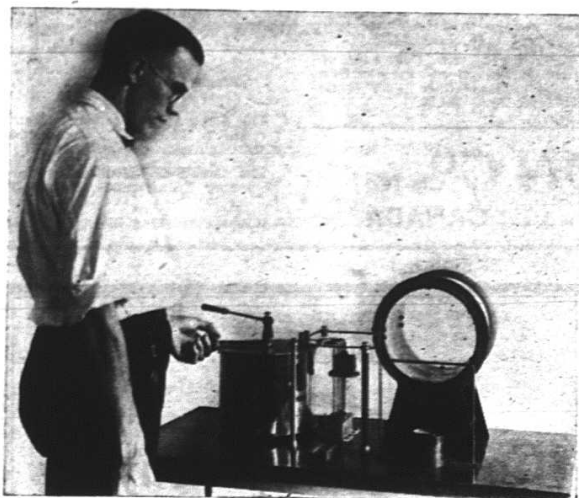


This book "Wireless Telephone in Your Home" will be sent to you for a less-than-cost charge of 25 cents.

# STANDARD WAVEMETER

Standard wavemeter type R 70B is shown in the accompanying photograph.

The variable condenser is of the Bureau of Standards type\* with the following modifications. The top of insulating material and metal has been replaced by a top entirely of metal. This top is nickel-plated with dull finish. The dull finish protects the eyes of the operator against glare and offers an appearance more sightly than would a bright surface which could not be polished properly without disrespect to the condenser. The insulating part of the handle has been made shorter and the handle itself made longer. The handle axis is pierced by a vertical screw by which it can be clamped to the condenser shaft or released from it and rotated freely. With this device the handle need never obstruct the view of the scale or enter the field of the wavemeter leads. The vertical screw requires more force to clamp and release than would a horizontal screw bearing against the condenser shaft, but it escapes the tendency the latter device has to cant the handle. The scale of the condenser has graduations much narrower than the scales used on Bureau of



Standards condensers previously made. The graduations are continued to  $190^\circ$ . This is to enable the vernier to function over the range between  $170^\circ$  and  $180^\circ$ . The vernier is engraved on a block beveled down to avoid parallax. The block extends to the rear in a flat spring by which it is securely pinned to the condenser top. The bevelled edge rests lightly on the condenser scale. The 0, 5 and 10 marks on the vernier are extended and numbered, and an extra division is laid off on either side of the 0 and 10 marks to aid in reading fractions of  $0.1$  and  $0.9$ . This is a very doubtful advantage, inasmuch as it is a little bewildering to read and sometimes causes errors of one degree. A reading glass is used in reading the scale. The engraving of scale and vernier was done by Mr. Rheinbold of the U. S. Naval Observatory. A slow motion mechanism has been attached to the condenser. An arm, extending from the rim to the centre of the condenser top, is pierced to encircle the condenser shaft, to which it can be clamped by a long screw. The arm and the condenser shaft so clamped can then be rotated

through a limited traverse by a screw at the rim of the condenser top. The condenser bearings, which were steel on brass lubricated with oil, have been replaced by steel on phosphor-bronze lubricated with powdered graphite. The slow motion device makes it feasible to have the bearings tighter than would permit precise setting without the device and thus to eliminate all detectible vertical play of the condenser shaft. The condenser shares the following features with other Bureau of Standards condensers. It is assured a constant calibration, with proper care, by its rigid construction, its shield, its unimpeded traverse through  $360^\circ$  without stops which jar the plates out of alignment, and its all but total lack of any dielectric except air. It has large semi-circular plates, not sheared at one edge or rounded at the corners, which give it a capacity calibration curve very nearly linear from  $5^\circ$  to  $170^\circ$ . The resistance is kept at a negligible value by the elimination of all insulating material except three short Pyrex glass rods which insulate the fixed plates from the movable plates and the shield. The condenser has a maximum capacity of 0.0012 microfarad.

Fixed mica condensers are used to supply additional capacity. Four shielded condensers are used having capacities of 0.001, 0.002, 0.004, and 0.008 microfarad, respectively. None of them has a phase angle greater than 5 minutes at 500,000 cycles a second. The high-potential terminals are rods extending up to the level of the top of the variable condensers and ending there in mercury wells. Four more mercury wells are in a projection from the high-potential terminals of the variable condenser, and by means of interchangeable links between the wells any combination of fixed condensers may be put in parallel with the variable condenser. The fixed condenser of 0.001 microfarad is raised on a metal column in order to shorten its high-potential lead and thus diminish any undesirable capacity effects that might result from a long lead. Such effects will be less important with condensers of greater capacity, and these are not raised, but left at the lower level, where they are not in the immediate field of the leads joining the condenser to the inductor.

These leads are of  $1/16$  inch brass rod, enclosing a square about 25 centimeters on a side. Four uprights support the leads. The two of these on the ungrounded side are made up of Pyrex glass in order to keep the resistance low. The upright nearest to that terminal of the variable condenser, which is connected to the shield, is of metal and extends through the top of the truck on which the wavemeter is grounded, terminating in a binding post for grounding. The shields of the fixed condensers are joined to this binding post. The fourth upright is a rod of ordinary insulating material. The leads end in two binding posts, into which the coil terminals can be thrust and clamped, all the coils having terminals at the same height and distance apart.

Of the seven coils to be used with this wavemeter, five are single-layer coils of polygonal cross-section. They are wound on skeleton frames, of laminated phenolic material, which furnish by their pen construction as near to an air core as the requirements of rigidity and strength permit. They are wound with silk-covered "high-frequency cable" (litzendraht), each strand of which was tested for continuity. The turns of wire are laid in notches in the coil frame. The binding posts are securely pinned to the frame to prevent their working loose and twisting the wire. The shape of the coils is the result

\*Bureau of Standards, Circular 74, Radio Instruments and Measurements, p. 290.



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Designed Especially for Wireless

### KICO STORAGE "B" BATTERIES

A Battery guaranteed to meet the demand for a REAL "B" Battery which will give years of service. One charge lasts from three to six months while in the detector plate circuit. Rectifier, chemicals and directions supplied. Plain with clips for adjustment, 32 volts, \$8; 48 volts, \$10; 65 volts, \$12. With control panels, \$10, \$12 and \$15.

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Made of the best materials and assembled in mono-block acid proof case. 6 volt, 800-100 A.H. capacity, \$24, with hydrometer; 8 volt, 80-100 A.H., \$27; 10 volt, 60-80 A.H., \$30. Write for literature.

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of compromise between considerations of low resistance, low effective capacity, and mechanical convenience. It may be shown that of all single-layer cylindrical coils with a given inductance and a given spacing between adjacent turns that one will have the least conductor resistance whose diameter is approximately 2.46 times its length of winding.\* On the other hand, the effective capacity of a single layer coil is roughly proportional to its diameter, and can, hence, for a given inductance, be reduced by decreasing the diameter and increasing the length of winding to compensate. Since the resistance of the coil does not begin to increase at any very startling rate until the coil is made longer than it is wide, the shape may be varied until the length is as nearly equal to the diameter as is convenient mechanically. Among the five coils under discussion the average ratio of coil diameter to length of winding is about 2.1. These five coils range in inductance from 10 to 5,000 microhenries. The lower limit is imposed by electrical considerations, the upper by mechanical considerations.

A coil wound on a skeleton frame similar to those of the single-layer coils, but having three spaced layers and designed to have an inductance of 23,000 microhenries is now being made. For a higher inductance a coil, bank-wound with high-frequency cable (litzendraht) on a

Pyrex glass cylinder is used. The wire is impregnated with cullodeon. The inductance of the coil is 128,000 microhenries.

The combination of condensers and coils described furnishes a range of wavelengths from 65 meters to 85,000 meters or, expressed in frequencies, from 4,600,000 cycles a second to 3,500 cycles a second.

To indicate resonance, a single turn of 1/8 inch brass rod is coupled to the wavemeter coil. The terminals of this loop end in mercury wells fastened at the bottom of an insulating cup. Ordinarily a sensitive thermo-galvanometer rests in this cup with its terminals dipping in the mercury wells. When greater sensitiveness is desired, this instrument is exchanged for a thermo-element with leads to a wall galvanometer. This turn is fixed so that its coupling with any one coil of the wavemeter is always the same. It is grounded on the side nearest the condenser.

The truck on which the wavemeter is mounted is a modified form of the dish truck, made by the Lansing Company, Lansing. The wheels are 6 inches in diameter, and rubber tired. All of them are of the swivel type, and have ball bearings at the swivel. The top of the truck is a heavy slab of maplewood. To it are screwed the fixed and variable condensers, the uprights supporting the leads, and the single turn used to indicate resonance. Rubber cushions are under the variable condenser to absorb shocks.

\*Bureau of Standards, Circular 74, Rado Instruments and Measurements, p. 120.

## RADIO CLUB REPORTS

On this section the Editor will be pleased to publish reports of any of the various Radio Clubs. Such reports should be submitted in the exact form in which they are to appear, the Editor, however, reserving the right to edit and curtail the reports if necessary. Papers of special interest read before such Clubs will be also acceptable for publication.

### GENERAL MEETING W.A.O.O.

Election of officers took place at a general meeting of the W.A.O.O held in Toronto at Room 25 Architecture Building, U. of T., on Feb. 9, 1922.

Seventy-six members turned up, the small attendance being probably due to the average club man's horror of elections.

The following officers are slated for the 1922 season:

Honorary President—Prof. T. R. Rosebrugh (acclamation).

President—A. H. K. Russell, 9AL (by acclamation).

Vice-President—H. H. Moor, 3CY (by acclamation).

Sec.-Treasurer—C. A. Lowry, 9AV (by accl.).

Executive Council—Messrs. E. Fowler, F. Burgess, W. Lawrie, R. Young and Wyman Clark (by vote).

Publicity Manager—Clarence Smith, 3GK, 24 Boswell Avenue, Toronto.

The retiring president thanked the executive and membership for their hearty co-operation during the year, and then gave over the chair to Mr. Russell, who then proceeded to outline the work of the coming year.

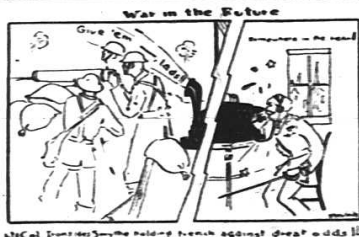
A contest is to be staged for which the prize is a battery charger. About twenty members have entered their names for the try. Each man is to speak for ten minutes on a radio subject, and the prize goes to the man who handles his subject most effectively. The speeches will be spread through several of the coming meetings of the club.

Mr. W. C. C. Duncan (9AW), gave a talk on a C. W. transmitter as used at 9AW for local telephony. The speaker showed how a low powered C. W. set could be economically substituted for the clumsy spark coil that adorns (?) so many of our amateur stations. Further details regarding the set at 9AW will be given in a later issue of this journal.

All W.A.O.O. men are reminded that 1922 fees are now due. \$1.00 please. Thanks!

CHAS. A. LOWRY, Radio 9AV.

Sec.-Treas., 219 Robert St., Toronto.



We are informed that the old S. P. S. Building has been turned over to the Department of Architecture, Faculty of Applied Science and Engineering. This historic old schoolhouse will henceforth be known as the Architecture Building.



# "CHELSEA" No. 50 AMPLIFYING TRANSFORMER

was designed for use with the present day models of vacuum tubes, and when so used produces remarkable amplification, with minimum noise. It is well adapted for table mounting or may be panel mounted in any position.

Terminals are marked for best connection. Only highest grade materials and workmanship employed. Its high efficiency together with its neat appearance and compactness, makes it a predominating feature in any radio receiving equipment.



**IMMEDIATE DELIVERY**

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Purchase from your dealer.  
If he does not have it, send to us.

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We regret that so many of you were disappointed in not getting a pair of **BROWN'S RECEIVERS** at the special price. Better luck next time.

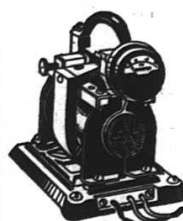
4 V. 80 Amp. Hr. Storage Battery -- \$13.50  
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OUR NEW PRICE LISTS ARE READY, 5c.

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## 10c CHARGES YOUR BATTERY

From Lamp Socket at HOME with an **F-F BATTERY BOOSTER**



and your station will never be closed because of a discharged battery.

F-F Battery Boosters charge automatically, operate unattended and last a lifetime. Full wave design means maximum current delivered. Carbon rectifying brushes maintain uninterrupted service at constant efficiency.

6 Amp. 6 Volt, Type 6 Size, \$15  
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Prices F.O.B. Cleveland, Shipping Weights, 12 and 15 lbs.

Mention Line Voltage and Cycles when ordering.

Also Boosters for 12 Volt batteries and for other frequencies.

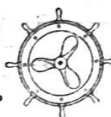
Your dealer will supply you, or send cheque direct for prompt express shipment. Or, if for Parcel Post, add Postage and Insurance charges. Or have us forward the Type you desire C.O.D. Order now or send for FREE descriptive Bulletin No. 35.

**THE FRANCE MFG. CO., CLEVELAND, OHIO, U.S.A.**  
Canadian Rep. Battery Service and Sales Co., Hamilton, Ont.  
For Group Charging use our Automatic Rotary Rectifier, 12 Battery, 8 Amp. Size, \$135

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HIGH-GRADE RADIO EQUIPMENT



"Better Radio Apparatus"

136 VENDOME AVE. N.D.G. MONTREAL P.Q.

## RADIO INQUIRY DEPARTMENT

Conducted under the direction of The Radio Research Club of Canada.

This department will be edited by the Secretary of the above club and the questions will be answered by the member considered to be most familiar with the particular field in question. Where the question is considered of sufficient importance it will form the basis for a discussion at a regular meeting of the club.

Answers will be given covering the full range of wireless subjects, but only those which relate to the technical phases of the art and which are of general interest to readers will be published here, other queries being answered by mail.

The subscriber's name and address must be given in all letters and only one side of the paper written on; where diagrams are necessary they must be on a separate sheet and drawn with India ink. Not more than five questions from one reader can be answered in the same issue. The club does not obligate itself to answer here any question entailing considerable research work, intricate calculations, patent research, etc. However, such an inquiry will be acknowledged and the writer advised as to the basis upon which the question can be answered.

### THE BROWN TELEPHONE.

This type of telephone for wireless work embodies a novel method for the conversion of the small currents in a receiving circuit into audible signals. A brief resumé of its construction may be of interest, as it is entirely different from any other make. The field coils are wound on rectangular fibre formers which are mounted on the pole-pieces of a permanent magnet as usual. This magnet is also of rectangular section but of semi-circular shape, fitting closely in the aluminum case. On these the coils are mounted, leaving a space of approximately 8 mm. between their ends. In line with this space but at opposite sides of the two field coils are the two pillars forming the support and stop for the vibrating reed. These pillars are cast integral with the receiver case. The reed is of iron and carefully tuned to a definite note, and is exactly the same in both earpieces. This in itself constitutes the most novel departure from standard practice. The magnet and coils are screwed to an aluminum plate at the back of the receiver case, and the position of this is controlled by a milled adjusting screw outside the case. It will thus be seen that the distance between the reed and the pole-pieces of the magnet is variable, giving an adjustment of sufficient range to enable maximum sensitivity to be obtained. The parts mentioned are entirely covered by a light aluminum cap into which is spun the coned aluminum diaphragm. A small hole is cut in this and a screw passed through, fastening it to the reed. The whole is covered and protected by a "screw-on" perforated cap. The thickness of the diaphragm is 2/1000ths of an inch, and it has been found that the maximum efficiency of this type of 'phone is at about a frequency of 965. Expressing efficiency as the ordinate and frequency as abscissae, it is found that there is a sharp rise in the curve after a frequency of 750 is reached, attaining its maximum height as mentioned at 965 with a more gradual tailing off as the higher frequencies are reached. The extraordinary sensitivity of this telephone in comparison with the disc diaphragm type is most marked when they are used for the reception of wireless telegraph signals. Stations inaudible in ordinary 'phones are rendered sharply and distinctly in the Brown telephone and ordinarily audible signals are greatly improved, both in strength and sharpness. These features are entirely due to the patented and scientific design and construction detailed above.

### AMRAD BROADCASTING NOW WGI.

1XE, the radiophone broadcasting station of the American Radio and Research Corporation, Medford, Hillside, Mass., is now WGI, according to announcement of the U. S. Department of Commerce. This change in call

letters is in line with the Department's recent ruling limiting the broadcasting of lectures, speech, concerts, etc., to commercial stations only. 1XE was an experimental license, and will be retained as such, but the broadcasting station will henceforth be known as WGI. WGI has a 1,000-mile radius and operates on 360 meters.

### "ALL DRESSED UP AND NO ONE TO SEE."

"All Dressed Up and No One to See" might have been the title of the wireless entertainment given by the Tufts College Musical Clubs Wednesday evening, February 8th, which reached all over the eastern half of the United States and part of Eastern Canada.

Although specifically told not to doll up, as no one could see them, some of the college boys could not conceive of singing to an audience of ten to thirty thousand and not being seen. And so, on the night of the radio performance they appeared in their "soup and fish" with clean collars and plastered hair parted in the middle. It was a shame, for there was no one to admire their stylish dress suits and clean cut appearance—no one but the whirring motor generators and a taciturn radio operator.

While there were no doubt hundreds of fair young ladies "listening in" on their efforts, the boys were denied the usual opportunity of "making a killing," so to speak. The concert by radio—so far as known the first of its kind ever given—was broadcasted by the American Radio and Research Corporation's Station at Medford Hillside, Mass. It could have been heard in Michigan and Indiana, Florida, Canada and ships at sea, as this station has a range of 800 to 1,000 miles in every direction.

College songs and musical selections made up the programme, which could have been heard by any one "tuning" Amrad 1XE (now WGI) between 8 and 9.30 o'clock. The concert was the mid-season climax of the Tufts College Musical Clubs, preceding their big indoor entertainment at Jordan Hall, Boston. It is conservatively estimated that 25,000 individuals comprised the invisible audience which heard the concert without any price of admission.

### CANDIDATES SUCCESSFUL IN EXAMINATIONS.

The Department of the Naval Service announce that ten (10) candidates were examined during the month of January, 1922, of which the following were successful and obtained Certificate of Proficiency in Radioteleggraphy:

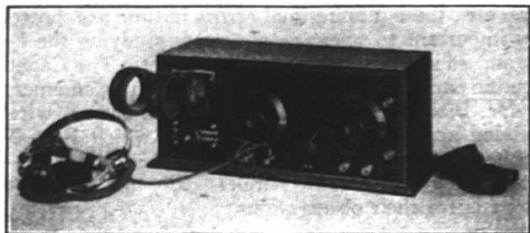
1st Class (Commercial)—A. Bader, Vancouver, B.C.; S. C. Carpenter, Vancouver, B.C.; H. K. W. McKenzie, Pictou, N.S.; R. M. Semple, Montreal, P.Q.; L. P. Thurber, Wolfville, N.S.

Experimental.—W. D. Wood, Vancouver, B.C.

WHOLESALE PRICES

# Radiophone

## CONCERTWAVE RECEIVER



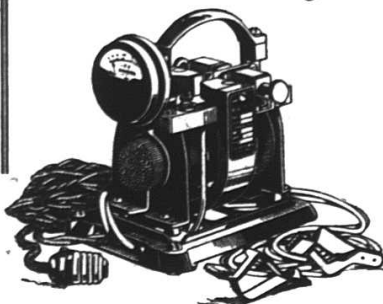
150-25,000 Meters Spark Phone and C. W. Long and Short Wave Duo Lateral Type.

**\$125** Complete with Phones and "B" Battery.

This is the most complete Radiophone Concert Receiving set on the market.

The items contained in this ad, together with an aerial which will cost from \$3.00 up according to installation required constitutes a complete receiving set to receive music from Pittsburg, Chicago, etc.

## F-F Battery Booster



You know what it is to have your friends call to "listen in" and then find your battery dead.

F-F Battery Boosters charge automatically, operating unattended. Screw plug in lamp socket, snap clips on battery terminals and see the gravity come up.

The Ammeter shows just the amount of current flowing, no guess work.

The full wave of current is rectified through adjustable carbon brushes which maintain a constant efficiency and last for thousands of hours. Everything complete to Ammeter and Battery Clips, in one compact and portable charging unit.

110 volt, single phase, 60 cycle

\$21.50

110 volt, single phase, 25 cycle

\$23.50

## "A" Real Storage Battery

Canadian  
Thorobred

6 Volts—50 Amperes.

3 Cells—7 Plates per Cell.

Size of Batt—7 3/8 x

6 3/8 x 9 1/4.

Size of Plate—5 3/8 x

1 3/4 x 9 6/16.

Guaranteed---

**\$15.00**



**BATTERY SERVICE AND SALES CO.**

JACK V. ELLIOT, Prop.

**HAMILTON - ONTARIO**

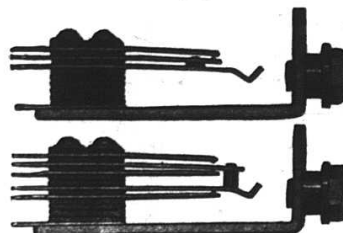


### Simplify Your Operation

Federal Anti - Capacity Switches should be used in circuits where ordinary switches would have too high a capacity, with resulting loss in signal strength.

Phosphor bronze springs, silver-plated; roller type cams; Bakelite insulation; silver contacts.

## FEDERAL Radio Apparatus



### Federal Filament Control Jacks

Eliminate innumerable switches and complicated controls on your Detector and Amplifying units.

Simplify operation; save current; make your set up-to date and efficient.



### Federal Universal Plugs

For plugging in head telephone sets, power supply, microphone transmitters, transmitting keys, or as many other things that the ingenious radio operator may think of.

A decided improvement over the ordinary telephone switch-board plug.

Write for more complete data on  
FEDERAL Wireless Equipment.

**Century Telephone and  
Construction Co., Inc.**  
BRIDGEBURG, ONT.

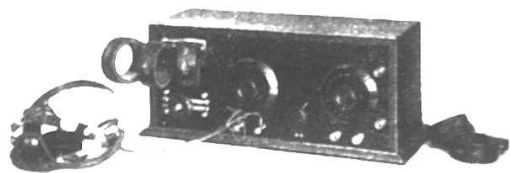
Canadian Distributors for

**Federal Telephone & Telegraph Co.,**  
BUFFALO, N.Y.

WIRELESS PRODUCTS

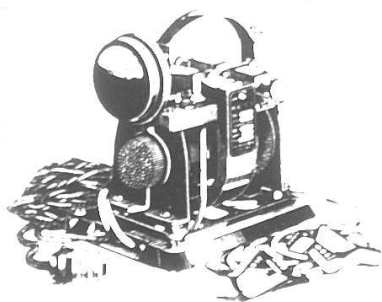
# Radiophone

## CONCERTWAVE RECEIVER



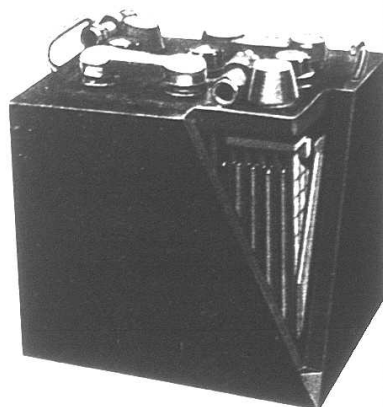
\$125

## F-F Battery Booster



## "A" Real Storage Battery

Canadian  
Thorobred



Guaranteed—  
\$15.00

BATTERY SERVICE AND SALES CO.  
HAMILTON, ONTARIO

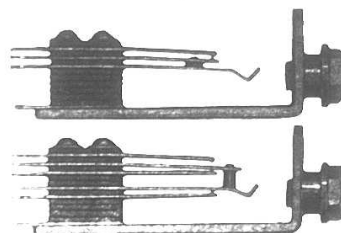


### Simplify Your Operation

Federal Patent Switches are used in circuits where a battery switch would have the right of way. They will result in a saving in space and strength.

Patented in the U.S. and Canada. They are a very latest design type and have no insulation except on the contacts.

## FEDERAL Radio Apparatus



### Federal Filament Control Jacks

These filament control jacks are used in circuits where a filament control switch is required. They are a very latest design type and have no insulation except on the contacts.

They are used in circuits where a filament control switch is required. They are a very latest design type and have no insulation except on the contacts.



### Federal Universal Plugs

These plugs are used in circuits where a universal plug is required. They are a very latest design type and have no insulation except on the contacts.

They are used in circuits where a universal plug is required. They are a very latest design type and have no insulation except on the contacts.

Write for more complete data on  
FEDERAL Wireless Equipment

Century Telephone and  
Construction Co., Inc.  
BRIDGEBURG, ONT.

Canadian Distributors for

Federal Telephone & Telegraph Co.  
BUFFALO, N.Y.



### RADIO TELLS THE TIME

"Tick, tick, tick!"

Nightly with rhythmic precision electric impulses shot from the great United States naval radio station at Arlington, near Washington, sound in the ears of Toronto's wireless amateurs, exactly at 10 p.m., announcing the official time to all who care to listen. Far out upon the Atlantic the sparks flash their message to ships which nowadays usually depend upon this signal to reckon their exact position on the map.

At Washington and Mare Island, Cal., are situated the two Yankee time stations. At each of these stations is located an accurately made and carefully guarded standard clock set in a vault beneath the surface of the earth, running in a partial vacuum at a constant temperature, wound every 30 seconds by electricity, and provided with a pendulum of invar (which will neither expand nor contract) and removed from jar or disturbing influence of any kind.

Man has not yet been able to construct an instrument which keeps truly accurate time. Some error, no matter how small, is always observable, and in a sufficient time that error will accumulate. But man has been able to construct a mechanism in which the error is reasonably constant. This error is known as the "rate" of the clock or chronometer, and if the true "rate" of the timekeeper is known a calculated plus or minus gives the true time by that clock.

It is to determine this "rate" and its changes that continuous observations of the stars on every clear night are made by the American stations. Solar or sun time, as it is known, varies, but sidereal time — that of certain stars — is invariable. These stars appear at a certain point in the heavens at an interval of 24 hours exactly.

At a specified time daily the telegraph companies clear their wires for five minutes to send out the official time. The signals are sent all over the United States and Canada, and clocks and watches regulated thereby on railways. And the message comes as a beat every second, omitting the 29th second, and lasting five seconds of every minute with a wait of 10 seconds just prior to noon.

The time is taken from the standard clock at the observation stations and put on the wire by a transmitting clock. Just 5 minutes prior to sending both clocks are thrown into circuits with recording pens upon a chronograph. The simultaneous records of the second beats of both clocks show immediately how much the true beat varies from that of the transmitting clock.

Thus ships are to-day independent of their chronometers. Latitude is, of course, ascertained by triangulating the sun with a sextant, but longitude is determined by the difference between local time and that of some other locality. The world accepts Greenwich (England) time as a standard in such calculations. So a ship's chronometers, of which she invariably carries three, to guard against inaccuracy, are set on Greenwich time. Should they get out of order the ship dependent on them is at once in deadly peril, for she cannot tell her location. And even three chronometers may get out of order.

Nowadays every vessel equipped with wireless gets the official time twice daily, and can find her location on the seas with ease and accuracy. In fact, the big liners sometimes don't do any calculating at all. In foggy weather, when observation is impossible, two land wireless stations several hundred miles apart can, by focussing upon the lost ship, work out her position in a few minutes by triangulation, figured out on a known base line and the distance from each station to the ship — which distance can also be estimated. The intersection of the two lines is, of course, the ship's position.

Though radio travels at the speed of light — 186,000 miles per second — remarks the Scientific American in a lengthy article on this subject, there is a loss of time in transmitting the true time, say from Washington to Australia, a distance of 12,000 miles. The flash takes one-fifteenth of a second to cover the distance, so a correction is made to overcome the error, as corrections are also made for shorter distances. Almost immaterial to railways, etc., these infinitesimal errors in time are, however, very important to scientific observers studying the heavens, and so must be calculated and offset. The Canadian scientific party in the Canadian far north this summer under Dr. Bibby of Toronto Observatory, have a wireless receiving apparatus with them — over which Fort Norman heard details of the Dempsey-Carpentier battle — so that they may get time by wireless daily and so have correct basis for their observations.

The wonderful exactitude of time is all based on the regular revolutions of the earth and other planets around the sun. The earth revolves on its axis once in twenty-four hours. The earth travels yearly a path of six hundred million miles around the sun. The sun and all its myriad satellites are moving through space towards an unknown destination. Yet out of this staggering aggregation of speed and complicated movement man can exactly determine an instant of time called noon and flash it by the mysterious agencies of electricity and ether broadcast to all the world.

### WHAT RADIO MEANS TO CANADA

Speaking on radiotelegraphy before the Montreal branch of the Engineering Institute of Canada, A. H. Morse, of the Canadian Marconi Company, said wireless was essential not only for the development of Canada's great unsettled territories, but for linking up important commercial centres separated by long tracts of thinly settled country, across which ordinary line telegraphic communication was subject to frequent and sometimes prolonged interruptions due to storms, etc. It was his opinion that the future of Canada was inseparably linked up with the wide application of wireless communication.

Perhaps one of the greatest dreads of town-bred prospective settlers in Canada was the isolation that was to be anticipated. This isolation Mr. Morse held to be no longer necessary, as every farmer could be supplied with a nightly bulletin of the world's news by wireless telegraphy or telephony, even though 500 miles from the nearest large town, and at a comparatively small expense every settlement throughout the great northwest could be put into telegraphic or telephonic communication with the outside world. He considered it impossible to exaggerate what radio meant to Canada.

### RESULTS OF SPECIAL TWELVE-TUBE RECEIVING SET

With a one-meter loop antenna and a special twelve-tube receiving set, remarkable results have been obtained of late in Paris. Even transmitters of low power have been heard some 5,000 miles away under conditions by no means ideal. In fact, messages have been recorded on photographic tape at times when commercial radio companies were greatly troubled with static. The twelve tubes employed for the receiver serve to detect, amplify and even filter the signals so that static and other parasitic disturbances are weeded out.



# OPERATION OF THE MODULATOR TUBE IN RADIO TELEPHONE SETS.

By E. S. Purington.

The modulator tubes of radio telephone transmitters used in commercial and military sets operate essentially as aperiodic power amplifiers of speech currents. The load on these tubes is determined approximately by the volt-ampere characteristics of the radio generating circuit, as measured at its plate power input terminals. At speech frequencies other effects occur as follows:

1. Current to the modulators and the generating circuit in parallel is supplied through an audio choke coil. The finiteness of the inductance of this coil results in an inductive component to the load.

2. The radio generating circuit contains suitable impedances to prevent consumption of radio power by the modulator tubes. These and other parts of the generating circuit may produce reactive components.

3. In consequence of the variation of the input power to the generating circuit, the desired speech variations of radio output power occur. Power must be generated to vary the electromagnetic energy associated with the output circuit, as well as to supply the resistance losses. A reaction occurs tending to produce a capacitive component to the load on the modulators.

The value of a radio telephone transmitter in conveying speech signals is measured not by the power output, but rather by the variation of power output during speech. Usually optimum results are obtained when the power rating of all the modulator tubes equals the power rating of all the radio generator tubes. Under these conditions the load upon the modulators is one into which they may operate with best efficiency.—(*Abstract of Scientific Paper No. 423, Bureau of Standards, Washington*).

## AERO CLUB OF CANADA ANNUAL ELECTION

The annual meeting of the Aero Club of Canada, held at the club headquarters, 34 Yonge Street, Toronto, resulted in a few changes in the directorate, but Lt.-Col. Thomas Gibson, C.M.G., D.S.O., etc., was re-elected president.

The result of the election leaves the remainder of the board as follows:

Vice-presidents—Col. Douglas G. Joy, A.F.C., Capt. E. A. McKay, M.C., D.S.O.

Honorary Treasurer—Lieut. C. E. Willows.

Honorary Secretary—Lieut. M. C. Purvis.

Directors—Capt. Dudley Hagarty, Mr. F. G. Ericson, Lieut. J. K. Shook, Lieut. H. S. Campbell Wilson, R.N. V.R.; Lieut. C. M. Shaw, Major A. M. Shook, D.S.O., D.F.C., A.F.C., etc.; Lieut. Harry Carnegie, Lieut. W. H. Martin, and Lieut. Cameron Urquhart.

His Royal Highness, the Prince of Wales, K.G., is Honorary President, while the past Presidents are Col. Wm. Hamilton Merritt (deceased), Capt. James P. Beaty, Lt.-Col. W. G. Barker, V.C., D.S.O., M.C., etc.; Major B. S. Wemp, D.F.C., etc.

Major E. G. Joy was elected corresponding secretary. Mrs. E. M. Wood continues as secretary in charge of the club.

At the annual meeting the affairs of the club were thoroughly discussed and the various reports received and approved. All of which show that the Aero Club of Canada, while having passed through a rather trying period, is now on the upgrade with every indication of a good year ahead. The re-organized board of directors have planned to hold frequent meetings for the purpose of making plans for the club's progress.

## "The Watchdog of the Tube"

This announcement is of vital interest to every Radio Amateur who desires to—

- (a) Obtain the best possible results from his tubes, and
- (b) Secure maximum life of his tubes.



**Weston**

**Radio Instruments**

Comprising

**Voltmeters, Milliammeters, Ammeters & Antennae Ammeters**

are now available for every Receiving and Transmitting requirement.

Their cost is little more than the cost of a tube. With reasonable care they will last a lifetime, offering a constant means of proper regulation for receiving, amplifying or transmitting tubes.

Write for Circular "J"

**Weston Electrical Instrument Co.**

177 Weston Ave., Waverly Park, Newark, N. J.

CANADIAN REPRESENTATIVES—

A. H. Winter-Joyner, Ltd., Toronto; Northern Electric Co. Ltd., Montreal, Ottawa, Winnipeg, Halifax, Regina, Vancouver, Calgary, Edmonton.

Owing to the fact that the annual meeting of the club was both called and held between the issue dates of the December and January editions of Aviation & Wireless News it was impossible to publish the date of the meeting in advance. Delay in receiving report of election prevents this report being included in the Aviation Section of this issue or a revision of the club announcements on page 4 this month.

Members will be glad to learn that the annual ball, held at Toronto, was a great success financially.

## CANADIAN FLYING CLUB

A special meeting of the Canadian Flying Club will be held on the premises of the Aero Club of Canada on Wednesday, March 16th at 6.00 p.m. The business to be taken up at this meeting is a vote on the following resolution, which will be presented at that meeting.

"Resolved that the balance of funds owned by The Canadian Flying Club and now held to their credit by the Aero Club of Canada amounting to \$85.66 be given to the Aero Club of Canada as the Canadian Flying Club is now inactive and the work it contemplated is being carried on by the said Aero Club of Canada."

E. GRAHAME JOY,

Secretary, Canadian Flying Club,

## Outfit Marketed from New "Radiophone" Hamilton

All people know the wonderful results which have been achieved during the past few years in perfecting wireless telegraphy, in demonstrating its practicability and adaptability to our modern commercial world.

All have heard about the wireless telephone, and certain citizens throughout our country have received in the same skeptical manner in which radiography was first received. It is a fact, nevertheless, that wonderful results have been achieved in experiments by amateurs who have proven that it is possible to receive concerts and musical entertainments in their own homes by this great modern invention, the Radiophone. The fact is that the wireless telephone is an actuality. It will soon be as commonly used as the phonograph.

It has, however, been a vexatious and costly experiment in gathering the different equipment from the many firms dealing in supplies; and not many as yet realize the possibilities of the Radiophone. The business man, with his many worries, has perhaps, hesitated because he did not care to add to his trouble by such experiments, when he thinks of his home as a place of relaxation from the cares of his business.

It is now possible, however, to purchase a complete equipment which will receive musical concerts from Pittsburgh, Chicago and other points, in your own home, and give splendid results.

We refer you to the announcement elsewhere in the magazine of Battery Service & Sales Company, Hamilton, Ontario, of which Mr. Jack V. Elliott is proprietor. This enterprising firm, realizing the possibilities of the Radiophone, has placed on the market a Radiophone Concertwave Receiver complete with phones, battery and charger, at the extremely low price of \$125.00, which will give you splendid results and enable you to receive Pittsburgh, New York or Chicago concerts without going out of your house. The only additional cost would be antennae wire, which forms your aerial and which brings the sound-wave to your equipment in your home. This requires only a short span of wire which could in many cases be attached to some point on roof of building, and would vary in cost from \$5.00 up, to a complete aerial with poles, etc., according to requirements, which would of course cost a little more. This equipment is all that is required unless you want to add amplifier and loud-

speaking horns for hall and concert work; and the Battery Service & Sales Company will be pleased to quote prices on this extra equipment upon request.

### A TRIP TO EASTERN U.S. RADIO MANUFACTURERS.

The editor had the pleasure, during the latter part of January and the early part of February, of visiting a number of the most prominent radio manufacturers located in Boston, New York City and intervening points. While the radio "game" has been progressing most favorably in Canada during the past year, yet it requires one's actual presence in the centre of such activities to realize the extent to which it has grown—and it is still far from its peak. Radio manufacturers everywhere are away behind in the filling of orders, and yet they are working overtime—in some cases employing full day and night shifts—and that in addition to enlarging their plants where physically possible.

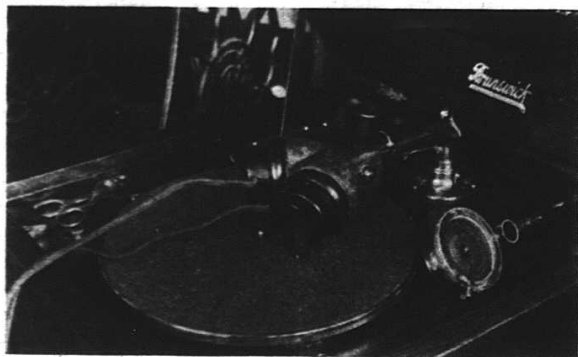
The popular magazines and the daily newspapers in the United States are featuring articles on radio. On the subway, on the street, and in the restaurants, everywhere you go, you are nearly sure to hear some reference to radio. "Well, what did you hear last night?" When that question is asked you are sure to be in the presence of owners of receiving sets.

For the receiving set is the thing upon which radio manufacturers are concentrating their efforts. Radio telephony did much to awaken people to wireless, then the broadcasting stations came into being, and it is to them that the greatest credit is due for placing radio where it is to-day.

As an entertainer and as an educator the broadcasting station is here to stay. The United States Government, realizing its importance and the necessity of protecting broadcasting of the proper kind, has already shut down on indiscriminate broadcasting, so that now only a commercial station with a fully qualified operator is allowed to broadcast. This prevents amateurs from broadcasting, and the application of that term to amateurs with transmitting sets will possibly be very wide.

Complete receiving sets of various kinds are being turned out to meet the requirements of the general public. In such sets, simplicity is the aim. Every effort is being made to divest radio of the shroud of mystery with which it was formerly enveloped. "Turn the knob and hear the music" will be the slogan of the future radio salesman. It is to the man who knows nothing of radio—in a scientific way—that manufacturers are now appealing, and it is the response to such appeals that is making the "game" flourish.

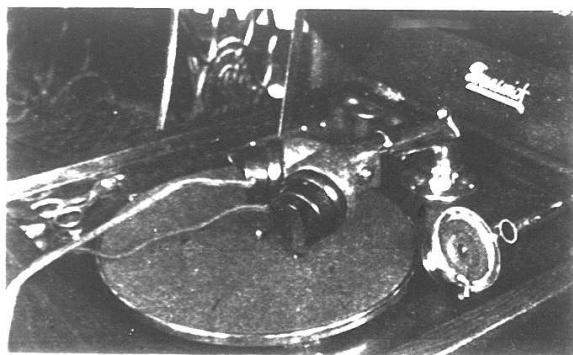
What will be the design of the future receiving set? Some more or less standard model is sure to be evolved. The gramophone cabinet makers will likely find in radio a new outlet for their products. A cabinet of the "Vicrola" type would seem to answer the purpose. Some manufacturers in the districts visited are already reported to be evolving plans for the making of such sets. A California manufacturer is already advertising such sets for sale. These latter include a magnavox built into the cabinet. Batteries are concealed in the compartment usually devoted to gramophone records, and the whole is made as simple and neat as possible. The question of the loop aerial as opposed to the outdoor house-aerial is still to be solved. We more or less know the extent to which we can use the loop-aerial as it is to-day, but what about to-morrow? A dream to-day is often a reality to-morrow.



Set now in use by Mr. F. K. D'Alton, Toronto, Sec.-Treas. of the Radio Research Club of Canada.

## Outfit Marketed from New "Radiophone" Hamilton

A TRIP TO EASTERN U.S. RADIO MANU-  
FACTURERS



Shown in picture is Mr. R. K. J. Wilson, President, New York City, of the Radio Research Corporation, Canada.



## Civil Aviation in Great Britain

We are indebted to His Majesty's Trade Commissioner in Toronto for the following statement, which is based on information furnished by his head office in London, the Department of Overseas Trade:

"A review has recently been made of the progress of the various sections of the aircraft industry during 1921. Unfortunately, nothing useful can be said concerning airships, but progress in aeroplane design, both for war and commerce, has been comparatively rapid. Since the Exhibition of 1920 the passenger transport aeroplane has been developed along certain fairly clear lines. One British type of commercial aeroplane, with a 450 h.p. engine, has been developed to carry eight passengers and a pilot at 130 miles per hour. This type has done excellent work on the London-Paris route during the past year. Later types of other makes include one carrying 10 passengers, a pilot, and a mechanic, with the same power, and another one carrying eight passengers and a pilot at 100 miles per hour, with a 375 h.p. engine.

In smaller engines a very interesting state exists. The Avro "Baby," which made a flight from London to Turin without a stop in nine hours with an engine of only 35 h.p., has been produced in several forms. One has been selected by Sir Ernest Shackleton for his expedition to the South Polar regions, while another has been developed into a type for India, and is known as the "Tropical Baby." A special type, intended for the owner-pilot, has been built for use in countries where other systems of transport are bad.

One of the oldest aeroplane firms has constructed a bi-plane entirely of metal, including sheet metal covering for the wings. This has done well in official tests. Among the sporting machines, the most notable is the

"Bamel," built by the Gloucestershire Company, with a 450 h.p. engine. This is stated to be probably the fastest aeroplane in the world.

Two very important developments during the year, of purely British origin, are the Fairey "flap-gear" and the Handley Page "slotted wing." The former is a form of wing by which the whole edge behind the rear spar may be deflected in an outward direction without interfering with the ailerons. By this means the total lift is increased, making it possible to alight slowly and to lift heavy loads at low speeds, or, otherwise, by setting the wing to its normal camber to maintain high speeds in the air. In the earliest form this arrangement was used in the country. The "slotted wing" is operated like a venetian blind, so that when the slots are closed the wing is normal, but when open the wing acts in the same way as a bird's wing when the pinion feathers are open in the act of alighting. By this simple device aeroplanes can start from exceedingly small spaces at low speeds, and can alight almost vertically.

Associated with the question of Commercial Aviation is the subject of Wireless Telephony. The safety of the passengers and machine, and, therefore, its commercial success, depends on a successful form of transmission of messages between the passengers or pilot with the ground. To this end experiments have been continuous, especially in direction-finding, or transmission to the pilot of bearings obtained from the ground. The Marconi organization has achieved a large measure of success in this direction, and their staff, by constant training and experience, have achieved such a degree of skill in wireless telephony as to make the aeroplane practically immune from risk due to faulty location."

## Aviation Activities in Saskatchewan

At a recent meeting of the Saskatchewan Air Service Association (Regina Branch), Aviation & Wireless News was made the official organ of the club. Under the energetic management of Mr. T. H. Spence and other members of the executive this association has been very active in aeronautical affairs in the Canadian West.

Just prior to the recent Dominion elections they sent out a circular letter to all candidates in the Province of Saskatchewan, which read as follows:

Dear Sir:—I am directed by general meeting of this body to ascertain your views as to the measure of financial and other support which should be accorded by the Government of Canada to:

- (i) Aviation generally.
- (ii) The maintenance of the nucleus of a Canadian air force.

We are interested in (i) on account of the rapid strides which are being made toward the development of commercial aviation in almost all civilized countries except Canada. Canadian aviators established a reputation for themselves in the Royal Air Force, and many of them, accustomed theretofore to other callings, found for the first time that their vocation was in the air. Now these men are being forced back into work for which they are not suited, simply because Canada is behind the other nations in regard to the development of their profession. Others of them, determined to follow up their chosen

profession, are leaving the country and are assisting—against their own principles—in the establishment of a commercial supremacy for foreign countries.

Our concern in (ii) is based on considerations similar to those under (i) insofar as they relate to the fitness of the Canadian for flying and the trained material now at hand. In addition, the Canadian Air Force deserves support as being the only training establishment in the country, the only place where the work already accomplished can be confirmed, new pilots trained, and mechanics receive instruction.

An expression of your views on these questions, together with a statement of the measure and nature of the support we may expect from you if returned to Parliament, will be appreciated at as early a date as you can find it convenient.

Yours very truly,

T. H. SPENCE,

Secretary.

Owing to a recent prosecution of an air pilot in Saskatchewan considerable interest has been aroused, and Mr. Spence writes as follows:

### Temporary Right-of-Ways (Aeroplanes)

Dear Sir,—After reading an extract in the local papers of Regina and Saskatoon, with reference to the recent case of R. J. Groome, commercial aviator, versus a civilian, upon the question of flying to the peril of the public,



I would appreciate the opportunity of discussing the following points for the benefit of readers of your paper:

Railroads are permitted to cross public thoroughfares, in which case it necessitates the caution of all pedestrians and drivers of vehicles to make sure that no trains are crossing such thoroughfares at the time that they may be using that part of the road. Before an aeroplane can obtain safety height for flying or making a safe landing on a public aerodrome it is necessary for such machines to make low altitude manoeuvres for such purposes, sometimes necessitating a machine passing over a public road or thoroughfare at practically a height less than twenty feet. These manoeuvres are governed or should be governed according to the wind conditions for the day, also as to the direction these machines may be taking off or landing. Until such a time as the aeroplane has been completed that will take the air immediately or descend immediately I consider a provision should be given for temporary right-of-way for aeroplanes crossing all thoroughfares whilst engaged in taking off or landing at all aerodromes or forced landing grounds adjoining such thoroughfares or roads, in which case it would mean that the pedestrians or drivers of vehicles would be expected to halt whilst an aeroplane was passing over the road that they may be on at such times, when only at a height of less than twenty feet.

As a protection for drivers or vehicles it might be possible to induce owners of public air harbors to erect at the four corners of all air harbors a mast with a wind indicator (sausage), thus indicating the direction of the wind and therefore advising the public the direction machines would be taking off or landing that day. The direction of the wind would be indicated by the wind indicator at all times.

### ENGLAND

A "flying liner," which may seriously compete in the matter of fares with pleasure steamers, is being built in England, and if the hopes which are centred in the machine are justified, it will also revolutionize commercial aviation.

This new craft will start from Charing Cross Pier and fly over river, sea and land to Paris, alighting on the Seine, in the heart of the city. Calls will be made at Tilbury, South End, Margate, and Ramsgate Piers. Should the service prove a success it will be extended to the south coast. In any event, the journey to Paris will be shortened by at least two hours, compared with the present London-Paris airway times.

### PERU

The aerial conquest of the Peruvian Andes was marked recently by the notable achievements of two Italian aviators. After one unsuccessful attempt to reach Cuzco, Aviator Rolandi returned to Lima and made a second attempt the next day, leaving Lima at 8 o'clock and arriving safely at Cuzco at 1 o'clock.

Aviator Ancillotto, who made the first flight between Cerro Depasco and Lima, left Lima at 10:30, arriving at Huanacay in 1 hour and 45 minutes. Both airmen used Spa planes equipped with two Spa motors.

### BOLIVIA

There is a project on foot which has the approval of the Bolivian Government for the foundation in that country of an aviation school for the purpose of development of commercial flying and improving communication with the adjoining countries. Included in the equipment of the proposed school will be hangars, machine shops, photographic workshops, and supplies.

### FRANCE

Two ex-German airships, L-72 and LZ-113, are in the possession of France, and it is understood that one of these is to be used for commercial purposes. At Ouers near Toulon, one shed 738 by 130 ft. is completed, and a second one of the same dimensions is under construction. The shed at Maubeuge, constructed by the Germans, which is 737 by 106 by 131, is at present used for accommodating the LZ-113. A large gas plant is being installed. Seven of the German airships allocated to France under the terms of the Peace Treaty are being dismantled with a view to their re-erection in France and the Colonies. It is understood that they will probably be erected at Marseilles, Paris, Tunis, Casablanca and Algiers.

Approximately 47,000,000 francs was allocated for work in connection with airships, airship stations, etc., in the French estimates for 1921.

The Union for Security in the Aeroplane, which is offering prizes for inventions tending to render airplane travel more safe, has awarded its first prize of 10,000 francs to Messrs. Gastambide and Lavasseur for their airplane with variable surface. The second prize has been awarded to M. LePrieur for his steering apparatus.

### ITALY

The navy has cut down its airship forces to a minimum, retaining only one large airship station in commission and six in reserve. The military department, which is also closely allied with civil enterprise, has retained the big experimental and structural works at Rome. Three airship stations are kept in full commission and five in reserve. One rigid airship surrendered by Germany is flown for experimental and training purposes. Owing to the disturbed state of the country and its finances, civil aviation, especially on the lighter-than-air side, is in a very unstable condition.

### HOLLAND

The largest airdrome in Holland has recently been established in Rotterdam, seven miles from the city. It is rather more than 1,100 yards long by 700 wide and, being perfectly flat and open, is well suited to the requirements of aircraft. A temporary railway has been made to bring gravel and other building material to the site, where a large shed has already been erected. Officers have been put up and premises for Customs, wireless, meteorological observations, a restaurant and a tower for illumination by night are either already in existence or projected. The whole has been planned on data embodying the latest experience.

### MOROCCO

The state-subsidized aerial mail and passenger service, established in 1919 by the Compagnie Latecoere between Toulouse and Rabat, the administrative capital of the French Zone of Morocco, was extended in 1920 to Casablanca, whilst the service was increased from 8 flights a month to four a week, and will soon be made a daily one. The service has worked with most commendable regularity, and it is a great boon to business men to be able to travel from Casablanca to Paris in 48 hours. The route followed on leaving Casablanca is Rabat, Malaga, Alicante, Barcelona, and Toulouse, which latter is reached on the afternoon of the day following the departure from Casablanca, in time to catch the evening express to Paris. The passenger fare is about Fr. 1,600 for the full flight from Casablanca to Toulouse, whilst letters pay a surtax of 1.25 francs.

### SEAPLANES IN JUNGLES OF VENEZUELA

One of the newest utilizations of the airplane is by the British Controlled Oilfields, Ltd., which has chartered two flying boats, with which it will prospect for oil in the hundreds of square miles of the jungle in Orinoca delta, Venezuela.

Because the jungle growth is so dense and the roots of trees make navigation in the rivers almost impossible, it was found that no other means afforded method of survey. It would be likely for an exploring party to pass within a few feet of an oil spring and be unaware of its existence. But because the vegetation withers and dies in the immediate vicinity of an oil spring, such spots may be easily discovered from the air and a photographic map of all likely territory is being made.

Because the country affords no possible landing fields and there are plenty of rivers for the seaplanes, this type of craft is being used.

### FLYING BETWEEN CANADA AND U.S.

The past summer has seen for the first time international flying to any appreciable extent between Canada and the United States, under definite Federal regulations in accordance with the terms of the International Air Convention, held in Paris, in connection with the Peace Conference. It has been necessary for the Canadian Air Board, in order to promote the growth of international flying, to make temporary provisions in favor of American airmen. Only American pilots with military or naval certificates are admissible, since the United States has not yet made arrangements for certificating commercial pilots.

Permission to carry passengers and goods between points in the United States and Canada has been granted to such American pilots on a number of occasions, and their flying machines have been registered as airworthy by the Air Board. Following the International Air Convention, foreign aviators are not permitted to enter Canada for the purpose of exhibition, nor to ply from point to point in Canada for hire with passengers or goods. This privilege is reserved to British subjects flying British-owned machines.

Americans have availed themselves of Canadian privileges for passenger-carrying, pleasure trips and long-distance flights covering Dominion territory. A mail service was organized between Seattle and Victoria, in order to meet steamers from the Orient, and collect and despatch mail. A similar service was instituted for passengers. A Canadian passenger service out of Montreal, carrying people to New York, was also organized during the summer, and several successful and very rapid trips were carried out.

Flying boats from New York to Cleveland and Detroit took a course via Montreal, Belleville and Toronto. They had to report "in" at a customs air harbor upon entering Canadian territory, and report "out" at a customs air harbor prior to crossing back into the United States. Permission was also given for a flight from California along the western coast of Canada to Alaska and Siberia.

In some instances it has been necessary for the Air Board to withhold permission to would-be American visitors. One airman wanted to fly across the border in order to make parachute descents at a Canadian summer resort. Another wished to fly over and give exhibitions of wing walking. Both were refused.

### NEW YORK-TO-HAVANA AIR SERVICE

A bi-monthly aerial service between New York City and Havana, Cuba, was inaugurated September 22 last, when two wealthy Cuban sportsmen left the air port, city of New York, 82nd street and Hudson river, on a flight to Havana, in the Aeromarine Navy six-passenger flying boat "Presidente Zayas." They were F. Lopez de Haro and Alegario Monteo. With them went Miss Dona Mobley and Miss Gladys Carruthers of New York.

The new flying boat has gone to take part in the winter operations between Key West and Havana and is piloted by D. C. Richardson and Richard Greisinger. It will make two stops during the 1,400-mile flight to Havana.

The two Cubans were given a remarkable send-off at the air port by a large number of friends, including Roberto Hernandez, representative of the Auto Club of Mexico and Cuba, and Fabian Garcia, representative of the Heraldo de Cuba.

The departure of the "Presidente Zayas" marks the inauguration of a direct flying service between New York and Cuba which is expected to become more frequent toward the end of the year and may develop into a regular weekly service.

### ADMINISTRATION OF AIR REGULATIONS, 1920

During the months of June and July the undermentioned cases in which special permission was granted United States citizens and commercial companies to undertake flights into or through Canadian territory, have been reported by the Controller of Civil Aviation. In each instance full compliance with the terms of the regulations relating to American citizens was required, which, among other things, prohibits flying for hire wholly within Canadian territory; that is, prohibits the carriage of passengers or goods for hire between any two points in Canada, or the performance of exhibition flying for hire:

(a) Aeromarine Engineering and Sales Company, New York City.—Permission granted on different occasions to fly one Aeromarine F-5L, and two HS-2L flying boats from New York to Cleveland and Detroit via Montreal, Belleville and Toronto, situated along the St. Lawrence seaplane route. Pilot and machine in each case were licensed and certified for a temporary period by the Air Board.

(b) Pacific Airways, Limited, Seattle, Wash.—Permission given to conduct a passenger service between Seattle, Wash., Victoria, B.C., and Vancouver, B.C., the machine to be used being a Curtiss HS2L flying boat. Both pilot and machine have been licensed and certified by the Air Board.

(c) C. O. Prest, Los Angeles, Cal.—Temporary permission given to fly an aeroplane of Mr. Prest's own design from Venice, Cal., across Western Canada en route to Alaska and Siberia. Machine has not been certified by the Air Board, hence it is to be flown only for private purposes. Permission to expire October 1, 1921.

(d) R. W. Judson, president of Continental Motors Corporation, Detroit, Mich.—Temporary permission granted for an extended pleasure cruise over Canadian waters in the vicinity of the Great Lakes, using a Curtiss triplane model "T" flying boat, piloted by H. D. Kantner. Machine has not been certified by the Air Board and hence is to be used only for private purposes.

### AERO CLUB OF CANADA

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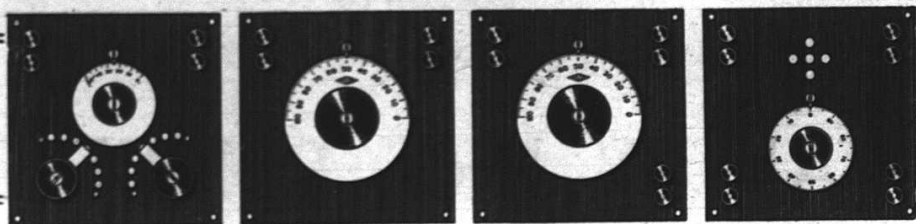
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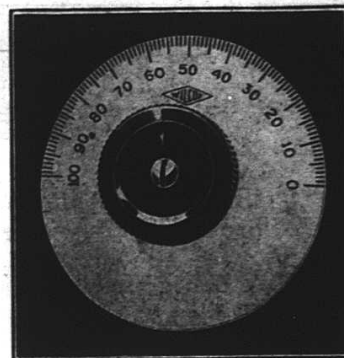
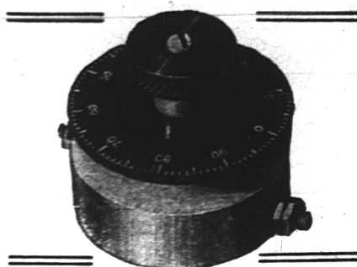
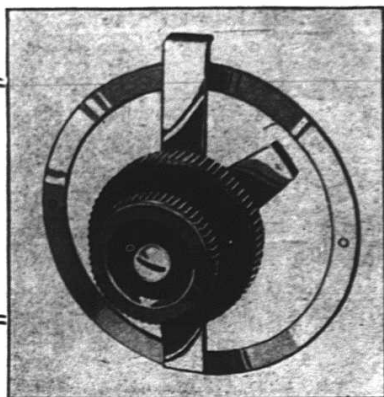
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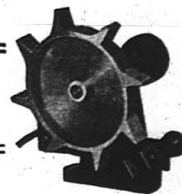
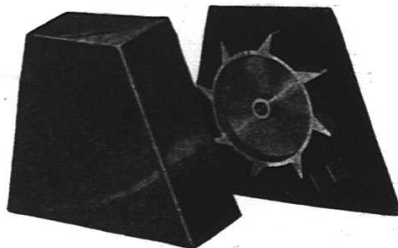
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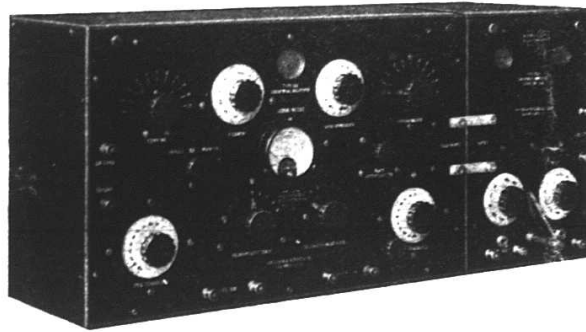
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